



## Product/process change notification: **PDP/25/15527** **8 inches Wafer Diameter Conversion for Filter and ESD Protection devices at ST Tours (France)**

PDP Group  
Discrete & Filter Division

Initial issue date: 24-Jul-2025 (Advanced PCN)

Final issue date: 17-Aug-2026 (Final PCN at qualification completion)

| Product family | Technology     | Package |
|----------------|----------------|---------|
| PROTECTION     | ESD and Filter | Various |

### Description of the change

Following Corporate **PCI 15383 (Early Notification)**, about Company reshaping program, please be informed that Die manufacturing line in 6 inches at ST Tours (France) for Filter and ESD Protection devices listed here below will be converted to 8 inches wafer diameter.

### Change summary:

|                              | Former               | New                  |
|------------------------------|----------------------|----------------------|
| Wafer manufacturing location | 6" ST Tours (France) | 8" ST Tours (France) |

### Marking and traceability:

Traceability of the change will be ensured by an internal codification (Finished Good/Type) printed on the carton box label.

| Commercial part number/Order code | Former Finished Good/Type | New Finished Good/Type                           |
|-----------------------------------|---------------------------|--------------------------------------------------|
| EMIF02-1003M6                     | EMIF02-1003M6/C           | Starting by <b>O</b><br><b>O</b> EMIF021003M6\$C |

| Affected product                                                                                                                                             |                                                                                                                                        |                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| EMIF02-1003M6<br>EMIF03-SIM02M8<br>EMIF04-1005M8<br>EMIF06-1005M12<br>EMIF06-MSD02N16<br>ESDA14V2BP6<br>ESDA14V2L<br>ESDA14V2SC6<br>ESDA19SC6<br>ESDA25-4BP6 | ESDA25W<br>ESDA5V3L<br>ESDA5V3SC5<br>ESDA5V3SC6<br>ESDA6V1-4BC6<br>ESDA6V1-5SC6<br>ESDA6V1-5W6<br>ESDA6V1L<br>ESDA6V1SC5<br>ESDA6V1SC6 | ESDA6V1U1RL<br>ESDA6V1W5<br>ESDALC6V1-5P6<br>ESDALC6V1P5<br>ESDALC6V1P6<br>ESDALC6V1W5<br>SM2T3V3A<br>SMLVT3V3<br>USBUF01W6<br>USBUF02W6 |

| Reason                                                                   |
|--------------------------------------------------------------------------|
| ST manufacturing reshaping program - Corporate PCI - Early Notification. |

| Date of implementation             |
|------------------------------------|
| First shipments forecast: Dec-2026 |

| Impact of the change |              |
|----------------------|--------------|
| Form                 | Not impacted |
| Fit                  | Not impacted |
| Function             | Not impacted |
| Reliability          | Not impacted |
| Processibility       | Not impacted |

| Qualification of the change (plan)                   |
|------------------------------------------------------|
| Qualification will be performed according to JESD47. |

| Disposition of former products                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Delivery of current products will be done until stock depletion.                                                                                                                  |
| <b>Current Finished Good Last Order Date: Apr-2026</b>                                                                                                                            |
| <i>Orders received after the expiration of the current Finished Good Last Order Date should be treated as orders for the new, modified Finished Good as outlined in this PCN.</i> |

| Qualification results                                                                                   |
|---------------------------------------------------------------------------------------------------------|
| Qualification report including qualification results is enclosed at the end of this document: 26039QRP. |
| <b>Qualification completion: August-2026</b>                                                            |

| Sampling plan                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Qualification samples will be available on demand (through Sales), starting from Aug-2026.                                                                                                                                    |
| For sample(s) request, please inform FSE (Field Sales Engineer) to insert corresponding <b>Non-Standard Samples Order</b> (a single Commercial Product for each request) with <b>PCN reference</b> as additional information. |

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# Qualification Report

## 8 inches Wafer Diameter Conversion for Filter and ESD Protection devices at ST Tours (France)

| General Information        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Locations                     |                                                                                |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------|
| <b>Product Line</b>        | IPAD / Protection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Wafer Fab</b>              | ST TOURS - FRANCE                                                              |
| <b>Product Description</b> | ASD - TRANSIL / IPAD LINE FILTER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Assembly Plant</b>         | ST SHENZHEN - CHINA<br>ST SUBCONTRACTOR - CHINA<br>ST SUBCONTRACTOR - MALAYSIA |
| <b>Product Perimeter</b>   | <div> <div>EMIF02-1003M6</div> <div>EMIF03-SIM02M8</div> <div>EMIF04-1005M8</div> <div>EMIF06-1005M12</div> <div>EMIF06-MSD02N16</div> <div>EMIF06-1005MX12Y</div> <div>ESDA14V2BP6</div> <div>ESDA14V2L</div> <div>ESDA14V2SC6</div> <div>ESDA19SC6</div> <div>ESDA25-4BP6</div> <div>ESDA25W</div> <div>ESDA5V3L</div> <div>ESDA5V3SC5</div> <div>ESDA5V3SC6</div> <div>ESDA6V1-4BC6</div> <div>ESDA6V1-5W6</div> <div>ESDA5V3LY</div> <div>ESDA5V3SC6Y</div> <div>ESDA6V1LY</div> </div> <div> <div>ESDA6V1SC5</div> <div>ESDA6V1SC6</div> <div>ESDA6V1U1RL</div> <div>ESDA6V1W5</div> <div>ESDALC6V1-1M2</div> <div>ESDALC6V1-5P6</div> <div>ESDALC6V1M3R</div> <div>ESDALC6V1P5</div> <div>ESDALC6V1P6</div> <div>ESDALC6V1W5</div> <div>SM2T3V3A</div> <div>SMLVT3V3</div> <div>USBUF01W6</div> <div>USBUF02W6</div> <div>ESDA6V1-5SC6</div> <div>ESDA25SC6Y</div> <div>ESDA6V1-5SC6Y</div> <div>ESDA25LY</div> <div>ESDA14V2LY</div> </div> | <b>Reliability Lab</b>        | ST TOURS – FRANCE                                                              |
| <b>Product Group</b>       | APMS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Reliability Assessment</b> | PASS                                                                           |
| <b>Product Division</b>    | Discrete & Filter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                               |                                                                                |
| <b>Package</b>             | QFN-6L, QFN-8L, QFN-12L, QFN-16L<br>SOT666, SOT23-3L, SOT23-5L, SOT23-6L<br>SOT323-3L, SOT323-5L, SOT323-6L<br>SO-8, SOD882, SOT883, SOT-665<br>SOT-666IP, DO-216AA, SMB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                                                                                |
| <b>Maturity level step</b> | QUALIFIED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                                                                                |

### DOCUMENT INFORMATION

| Version | Date        | Pages | Prepared by     | Approved by                                                                                                     | Comments                                                                                      |
|---------|-------------|-------|-----------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 1.0     | 12-Aug-2026 | 21    | Ilyes TAYEB BEY | Timothée PINGAULT<br><small>Digitally signed by Timothée PINGAULT<br/>Date: 2026.08.12 12:16:14 +02'00'</small> | 8 inches Wafer Diameter Conversion for Filter and ESD Protection devices at ST Tours (France) |

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                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------------|
| AEC-Q101 Rev.E     | Failure Mechanism Based Stress Test Qualification for Discrete Semiconductors in Automotive Applications |
| AEC-Q005           | Pb-Free Test Requirements                                                                                |
| AEC-Q006           | Qualification Requirements for Components Using Copper (Cu) Wire Interconnections                        |
| 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**

|        |                                             |
|--------|---------------------------------------------|
| BS     | Bond Shear                                  |
| DPA    | Destructive Physical Analysis               |
| DS     | Die Shear                                   |
| ESD    | Electro-Static Discharge                    |
| EV     | External Visual                             |
| H3TRB  | High Humidity High Temperature Reverse Bias |
| HTRB   | High Temperature Reverse Bias               |
| PC     | Preconditioning                             |
| PV     | Parametric Verification                     |
| RSH    | Resistance to Soldering Heat                |
| SS     | Sample Size                                 |
| TC     | Temperature Cycling                         |
| UHAIST | Unbiased Highly Accelerated Stress Test     |
| WBS    | Wire Bond Strength                          |

### 3 RELIABILITY EVALUATION OVERVIEW

#### 3.1 Objectives

The objective of this report is to qualify 8 inches Wafer Diameter Conversion for Filter and ESD Protection automotive grade devices at ST Tours (France), following Corporate PCN 15526 & PCN 15527 about company reshaping program.

Table of involved product:

| Commercial Product | Package   | Commercial Product | Package   |
|--------------------|-----------|--------------------|-----------|
| EMIF02-1003M6      | QFN-6L    | ESDA6V1L           | SOT23-3L  |
| EMIF03-SIM02M8     | QFN-8L    | ESDA6V1SC5         | SOT23-5L  |
| EMIF04-1005M8      | QFN-8L    | ESDA6V1SC6         | SOT23-6L  |
| EMIF06-1005M12     | QFN-12L   | ESDA6V1U1RL        | SO-8      |
| EMIF06-MSD02N16    | QFN-16L   | ESDA6V1W5          | SOT323-5L |
| ESDA14V2BP6        | SOT666    | ESDALC6V1-1M2      | SOD882    |
| ESDA14V2L          | SOT23-3L  | ESDALC6V1-5P6      | SOT666    |
| ESDA19SC6          | SOT23-6L  | ESDALC6V1M3R       | SOT883    |
| ESDA25-4BP6        | SOT666    | ESDALC6V1P5        | SOT-665   |
| ESDA25W            | SOT323-3L | ESDALC6V1P6        | SOT-666IP |
| ESDA5V3L           | SOT23-3L  | ESDALC6V1W5        | SOT323-5L |
| ESDA5V3SC5         | SOT23-5L  | SM2T3V3A           | DO-216AA  |
| ESDA5V3SC6         | SOT23-6L  | SMLVT3V3           | SMB       |
| ESDA6V1-4BC6       | SOT23-6L  | USBUF01W6          | SOT323-6L |
| ESDA6V1-5SC6       | SOT23-6L  | USBUF02W6          | SOT323-6L |
| ESDA6V1-5W6        | SOT323-6L | ESDA5V3LY          | SOT23-3L  |
| ESDA25SC6Y         | SOT23-6L  | ESDA5V3SC6Y        | SOT23-6L  |
| EMIF06-1005MX12Y   | QFN-12L   | ESDA6V1LY          | SOT23-3L  |
| ESDA6V1-5SC6Y      | SOT23-6L  | ESDA25LY           | SOT23-3L  |
| ESDA14V2LY         | SOT23-3L  |                    |           |

| PCN                 | Item           | Before              | After               |
|---------------------|----------------|---------------------|---------------------|
| 15526<br>&<br>15527 | Wafer diameter | 6 inches (ST Tours) | 8 inches (ST Tours) |

The reliability test methodology used follows the JESD47: « Stress Test driven Qualification Methodology » and AEC-Q101 revE guidelines.

The reliability tests ensuing are:

- TC 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, UHAST to check the robustness to corrosion and the good package hermeticity.
- RSH to check compatibility of package with customer assembly.

## 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.

Based on these results, 8 inches wafer diameter conversion for Filter and ESD Protection devices at ST Tours (France) is compliant with AEC-Q101 Rev.E.

## 4 DEVICE CHARACTERISTICS

### 4.1 Device description

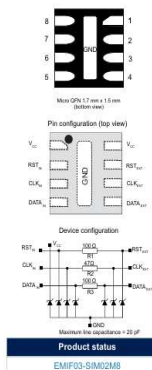
Refer to product datasheets.



EMIF03-SIM02M8

Datasheet

3 line IPAD, EMI filter for SIM card applications



#### Features

- SIM card EMI low-pass filter
- High efficiency in EMI filtering
- Very low PCB space consuming: 1.7 mm x 1.5 mm
- Very thin package: 0.6 mm max.
- High efficiency in ESD suppression on external pins (IEC 61000-4-2 level 4)
- High reliability offered by monolithic integration
- High reduction of parasitic elements through integration and wafer level packaging
- Lead free package
- Easy layout and flexibility thanks to I/O topology
- Low clamping voltage
- Complies with following standards:
  - IEC 61000-4-2 level 4 external pins
    - 15 kV (air discharge)
    - 8 kV (contact discharge)
  - IEC 61000-4-2 level 2 internal pins
    - 2 kV (air discharge)
    - 2 kV (contact discharge)
- MIL STD 883G - Method 3015-7 Class 3A (all pins)

#### Applications

- Where EMI filtering in ESD sensitive equipment is required:
- Keyboard for mobile phones
  - Computers and printers
  - Communication systems
  - MCU boards

#### Description

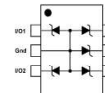
The EMIF03-SIM02M8 is a 3 line highly integrated device designed to suppress EMI/RFI noise in all systems exposed to electromagnetic interference. This filter includes ESD protection circuitry, which prevents damage to the application when subjected to ESD surges up to 15 kV on the external pins.



ESDA6V1-5SC6Y

Datasheet

Automotive 5 lines TVS for ESD protection



#### Features

- AEC-Q101 qualified
- 5 unidirectional TVS functions
- UL 94, V0
- J-STD-020 MSL level 1
- Benefit:
  - Suitable for high density boards
- Complies with the standard ISO 10605 / IEC 61000-4-2: C = 150 pF, R = 330 Ω
  - ±30 kV (air discharge)
  - ±18 kV (contact discharge)
- Complies with the standard ISO 10605: C = 330 pF, R = 330 Ω
  - ±20 kV (air discharge)
  - ±13 kV (contact discharge)
- Complies with the standard ISO 7637-3
  - Pulse 3a: VS = -150 V
  - Pulse 3b: VS = +100 V

#### Applications

- Where ESD and EOS transient overvoltage protection in susceptible equipment is required, such as:
- Information - entertainment
  - Signal communications
  - Connectivity
  - Comfort and convenience

#### Description

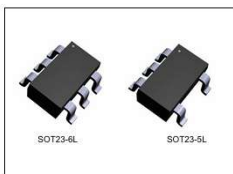
The ESDA6V1-5SC6Y is a monolithic voltage suppressor designed to protect components which are connected to data and transmission lines against ESD. It clamps the voltage just above the logic level supply for positive transients, and to a diode drop below ground for negative transient.



ESDAxxSCxY

Automotive quad-line Transil™ transient voltage suppressor (TVS) for ESD protection

Datasheet - production data



#### Features

- 4 unidirectional Transil functions
- 400 W peak pulse power (8/20 μs)

#### Benefits

- High EOS and ESD protection levels
- Suitable for high density boards
- AEC-Q101 qualified

#### Complies with the following standards:

- ISO 10605: C = 150 pF, R = 330 Ω
  - 30 kV (air discharge)
  - 30 kV (contact discharge)
- ISO 10605: C = 330 pF, R = 330 Ω
  - 30 kV (air discharge)
  - 30 kV (contact discharge)
- ISO 7637-2
  - Pulse 1: VS = -100 V
  - Pulse 2a: VS = +50 V
  - Pulse 3a: VS = -150 V
  - Pulse 3b: VS = +100 V

#### Applications

Where ESD and EOS transient overvoltage protection in susceptible equipment is required, such as:

- Information - entertainment
- Signal communications
- Connectivity
- Comfort and convenience

#### Description

The ESDAxxSCxY devices are monolithic voltage suppressors designed to protect components which are connected to data and transmission lines against ESD.

They clamp the voltage just above the logic level supply for positive transients, and to a diode drop below ground for negative transient.

Figure 1. Pin configuration

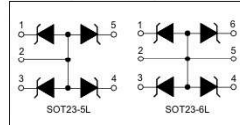


Table 1. Device summary

| Order code   | V <sub>BR</sub> (min.) | Package  |
|--------------|------------------------|----------|
| ESDAV3SC6Y   | 5.3                    | SOT23-6L |
| ESDA6V1SC6Y  | 6.1                    | SOT23-6L |
| ESDA14V2SC6Y | 14.2                   | SOT23-5L |
| ESDA14V2SC6Y | 14.2                   | SOT23-6L |
| ESDA25SC6Y   | 25                     | SOT23-6L |



ESDAxxSCx

Quad Transil™ array for ESD protection

Datasheet - production data



#### Features

- 4 unidirectional ESD protection
- 400 W peak pulse power (8/20 μs)
- Benefits
  - High ESD protection level: up to 30 kV
  - High integration
  - Suitable for high density boards
- Complies with the following standards
  - IEC 61000-4-2 level exceed level 4:
    - 30 kV (air discharge)
    - 30 kV (contact discharge)
- MIL STD 883E - Method 3015-7: class3B
  - human body model

#### Applications

Where transient overvoltage protection in ESD sensitive equipment is required, such as:

- Computers
- Printers
- Communication systems
- Cellular phone handsets and accessories
- Other telephone set
- Set top boxes

#### Description

The ESDAxxSCx and ESDAxxSC6 are monolithic voltage suppressors designed to protect components which are connected to data and transmission lines against ESD.

They clamp the voltage just above the logic level supply for positive transients, and to a diode drop below ground for negative transient.

Figure 1. ESDAxxSC5 functional diagram

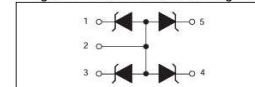


Figure 2. ESDAxxSC6 functional diagram

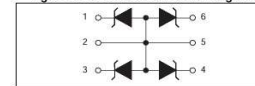


Table 1. Device summary

| Order code  | V <sub>BR</sub> min. | Package  |
|-------------|----------------------|----------|
| ESDAV3SC5   | 5.3 V                | SOT23-5L |
| ESDAV3SC6   | 5.3 V                | SOT23-6L |
| ESDA6V1SC5  | 6.1 V                | SOT23-5L |
| ESDA6V1SC6  | 6.1 V                | SOT23-6L |
| ESDA14V2SC5 | 14.2 V               | SOT23-5L |
| ESDA14V2SC6 | 14.2 V               | SOT23-6L |
| ESDA19SC6   | 19 V                 | SOT23-6L |
| ESDA25SC6   | 25 V                 | SOT23-6L |

TM: Transil is a trademark of STMicroelectronics.



Application Specific Discretes  
A.S.D.

## ESDA6V1U1 TRANSIL ARRAY FOR ESD PROTECTION

### APPLICATIONS

Where transient overvoltage protection in ESD sensitive equipment is required, such as:

- COMPUTERS
- PRINTERS
- COMMUNICATION SYSTEMS
- GSM HANDSETS AND ACCESSORIES
- CAR RADIO

It is particularly recommended for parallel port protection where the line interface withstands only 2 kV ESD surge.

### FEATURES

- 6 UNIDIRECTIONAL TRANSIL FUNCTIONS
- LOW LEAKAGE CURRENT:  $I_{le}$  max. < 2  $\mu$ A
- 200 W PEAK PULSE POWER (8/20  $\mu$ s)

### DESCRIPTION

The ESDA6V1U1 is a monolithic voltage suppressor designed to protect components which are connected to data and transmission lines against ESD.

It clamps the voltage just above the logic level supply for positive transients, and to a diode drop below ground for negative transients.

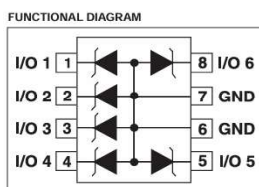
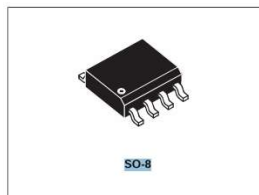
### BENEFITS

- High ESD protection level: up to 25 kV
- High integration
- Suitable for high density boards

### COMPLIES WITH THE FOLLOWING STANDARDS:

IEC61000-4-2: level 4

MIL STD 883C-Method 3015-7: class3B (human body model)



August 2002 - Ed. 3A

1/6



## ESDALC6V1-5P6

ESD protection for high speed interface

### Features

- Diode array topology
- Low capacitance (12 pF typical)
- Lead-free package

### Benefits

- Low capacitance uni-directional ESD protection.
- Low PCB space consuming, 2.5 mm<sup>2</sup> max. footprint
- Low leakage current
- High reliability offered by monolithic integration

### Complies with the following standards

- IEC 61000-4-2 level 4:
  - 8 kV (contact discharge)
  - 15 kV (air discharge)
- MIL STD 883G-Method 3015-7: class3B
  - Human body model

### Applications

Where transient overvoltage protection in ESD sensitive equipment is required, such as:

- Computers
- Printers
- Communication systems
- Cellular phone handsets and accessories
- Video equipment

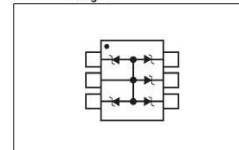
### Description

The ESDALC6V1-5P6 is a monolithic array designed to protect up to 5 lines against ESD transients.

The device is ideal for high speed interface applications where both reduced printed circuit board space and power absorption capability are required.



Figure 1. ESDALC6V1-5P6 functional diagram



November 2007

Rev 3

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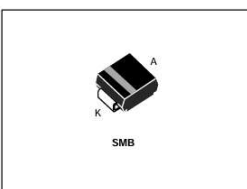
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## SMLVT3V3

Low voltage Transil™

Datasheet - production data



### Description

This is a Transil diode designed specifically to protect sensitive 3.3 V equipment against transient overvoltages.

Transil diodes provide high overvoltage protection by clamping action. Their instantaneous response to transient overvoltages make them particularly suited to protect voltage sensitive devices such as MOS technology and low voltage supplied ICs.

TM: Transil is a trademark of STMicroelectronics

### Features

- Peak pulse power 600 W (10/1000  $\mu$ s)
- Stand-off voltage 3.3 V
- Unidirectional type
- Low clamping factor
- Fast response time
- JEDEC registered package outline

April 2017

DocID4146 Rev 5

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This is information on a product in full production.

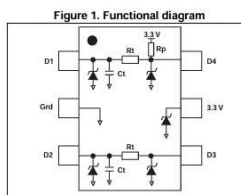
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## USBUF

EMI filter and line termination for USB upstream ports

Datasheet - production data



### Features

- Monolithic device with recommended line termination for USB upstream ports
- Integrated  $R_t$  series termination and  $C_t$  bypassing capacitors.
- Integrated ESD protection
- Small package size
- Benefits
  - EMI / RFI noise suppression
  - Required line termination for USB upstream ports
  - ESD protection exceeding IEC 61000-4-2 level 4
  - High flexibility in the design of high density boards
  - Tailored to meet USB 1.1 standard

- Complies with the following standards IEC 61000-4-2, level 4
  - $\pm$  15 kV (air discharge)
  - $\pm$  8 kV (contact discharge)
- MIL STD 883E, Method 3015-7
  - Class 3 C = 100 pF; R = 1500  $\Omega$
  - 3 positive strikes and 3 negative strikes (F = 1 Hz)

### Application

EMI Filter and line termination for USB upstream ports on:

- USB Hubs
- PC peripherals

### Description

The USB specification requires upstream ports to be terminated with pull-up resistors from the D+ and D- lines to Vbus. On the implementation of USB systems, the radiated and conducted EMI should be kept within the required levels as stated by the FCC regulations. In addition to the requirements of termination and EMC compatibility, the computing devices are required to be tested for ESD susceptibility.

The USBUF provides the recommended line termination while implementing a low pass filter to limit EMI levels and providing ESD protection which exceeds IEC 61000-4-2 level 4 standard. The device is packaged in a SOT323-6L which is the smallest available lead frame package (50% smaller than the standard SOT23).

Table 1. Device summary

| Order codes | Marking |
|-------------|---------|
| USBUF01W6   | UU1     |
| USBUF02W6   | UU2     |

August 2015

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This is information on a product in full production.

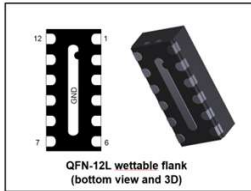
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## EMIF06-1005MX12Y

Automotive 6-line IPAD™ low capacitance EMI filter and  
ESD protection in micro QFN package

Datasheet - production data



### Features

- AEC-Q101 qualified
- EMI symmetrical (I/O) low-pass filter
- High efficiency in EMI filtering: -34 dB at frequencies from 900 MHz to 1.8 GHz
- Very low PCB space consumption: 3 mm x 1.35 mm
- Very thin package: 0.8 mm max
- High efficiency in ESD suppression on input pins (IEC 61000-4-2 level 4)
- High reliability offered by monolithic integration
- High reduction of parasitic elements through integration and wafer level packaging
- Lead-free package

### Complies with the following standards

- IEC 61000-4-2 level 4 input and output pins
  - 15 kV (air discharge)
  - 15 kV (contact discharge)
- ISO10605 input and output pins:
  - 11kV (air discharge)
  - 11kV (contact discharge)
- MIL STD 883G - method 3015-7 Class 3B (all pins)

### Applications

Where EMI filtering in ESD sensitive equipment is required:

- LCD and camera for cars
- DSP inputs
- V2V, V2I communication systems
- Digital tuner inputs

### Description

This is a highly integrated 6-line device designed to suppress EMI/RFI noise in all systems exposed to electromagnetic interference.

This filter includes ESD protection circuitry, which prevents the application from damages when subjected to ESD surges up to 15 kV on the input pins.

Figure 1: Pin configuration (top view)

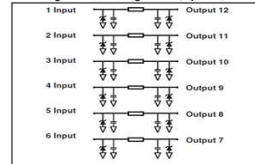
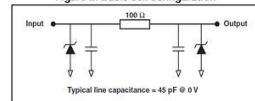


Figure 2: Basic cell configuration



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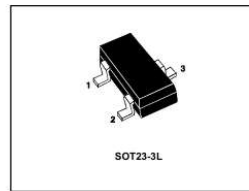
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## ESDAL

Dual Transil™ array for ESD protection

Datasheet - production data



SOT23-3L

### Applications

Where transient overvoltage protection in ESD sensitive equipment is required, such as:

- Entertainment
- Signal communications
- Connectivity
- Comfort and convenience

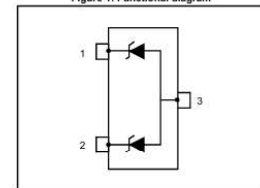
### Description

This device is a diode array designed to protect 1 line or 2 lines against ESD transients.

The device is ideal for applications where both reduced line capacitance and board space saving are required.

It can also be used as bidirectional suppressor by connecting only pin 1 and 2.

Figure 1: Functional diagram



### Features

- Unidirectional device
- Low leakage current ( $I_{lk}$  max.  $< 20 \mu A$  at  $V_{RR}$ )
- 300 W peak pulse power (8/20  $\mu s$ )

### Benefits

- High ESD protection level: up to 30 kV
- High integration
- Suitable for high density boards

### Complies with the following standards

- IEC 61000-4-2 (exceeds level 4):
  - 30 kV (air discharge)
  - 30 kV (contact discharge)

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DocID7058 Rev 5

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This is information on a product in full production.

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## 4.2 Construction Note

|                                   | ESDA25SC6Y                  |
|-----------------------------------|-----------------------------|
| <b>Wafer/Die fab. information</b> |                             |
| Wafer fab manufacturing location  | ST TOURS - FRANCE           |
| Technology / Process family       | ASD - TRANSIL               |
| <b>Assembly information</b>       |                             |
| Assembly site                     | ST SUBCONTRACTOR - MALAYSIA |
| Package description               | SOT23-6L                    |
| Molding compound                  | ECOPACK®2 ("Halogen-free")  |
| <b>Final testing information</b>  |                             |
| Testing location                  | ST SUBCONTRACTOR - MALAYSIA |

|                                   | EMIF06-1005MX12Y            |
|-----------------------------------|-----------------------------|
| <b>Wafer/Die fab. information</b> |                             |
| Wafer fab manufacturing location  | ST TOURS - FRANCE           |
| Technology / Process family       | IPAD LINE FILTER            |
| <b>Assembly information</b>       |                             |
| Assembly site                     | ST SUBCONTRACTOR - MALAYSIA |
| Package description               | QFN-12L                     |
| Molding compound                  | ECOPACK®2 ("Halogen-free")  |
| <b>Final testing information</b>  |                             |
| Testing location                  | ST SUBCONTRACTOR - MALAYSIA |

|                                   | ESDA6V1-5SC6Y               |
|-----------------------------------|-----------------------------|
| <b>Wafer/Die fab. information</b> |                             |
| Wafer fab manufacturing location  | ST TOURS - FRANCE           |
| Technology / Process family       | ASD - TRANSIL               |
| <b>Assembly information</b>       |                             |
| Assembly site                     | ST SUBCONTRACTOR - MALAYSIA |
| Package description               | SOT23-6L                    |
| Molding compound                  | ECOPACK®2 ("Halogen-free")  |
| <b>Final testing information</b>  |                             |
| Testing location                  | ST SUBCONTRACTOR - MALAYSIA |

|                                   | EMIF03-SIM02M8             |
|-----------------------------------|----------------------------|
| <b>Wafer/Die fab. information</b> |                            |
| Wafer fab manufacturing location  | ST TOURS - FRANCE          |
| Technology / Process family       | IPAD LINE FILTER           |
| <b>Assembly information</b>       |                            |
| Assembly site                     | ST SUBCONTRACTOR - CHINA   |
| Package description               | Micro QFN 1.7 mm x 1.5 mm  |
| Molding compound                  | ECOPACK®2 ("Halogen-free") |
| <b>Final testing information</b>  |                            |
| Testing location                  | ST SUBCONTRACTOR - CHINA   |

|                                   | ESDA19SC6                  |
|-----------------------------------|----------------------------|
| <b>Wafer/Die fab. information</b> |                            |
| Wafer fab manufacturing location  | ST TOURS - FRANCE          |
| Technology / Process family       | ASD - TRANSIL              |
| <b>Assembly information</b>       |                            |
| Assembly site                     | ST SUBCONTRACTOR - CHINA   |
| Package description               | SOT23-6L                   |
| Molding compound                  | ECOPACK®2 ("Halogen-free") |
| <b>Final testing information</b>  |                            |
| Testing location                  | ST SUBCONTRACTOR - CHINA   |

|                                   | ESDA6V1U1RL                |
|-----------------------------------|----------------------------|
| <b>Wafer/Die fab. information</b> |                            |
| Wafer fab manufacturing location  | ST TOURS - FRANCE          |
| Technology / Process family       | ASD - TRANSIL              |
| <b>Assembly information</b>       |                            |
| Assembly site                     | ST SHENZHEN - CHINA        |
| Package description               | SO-8                       |
| Molding compound                  | ECOPACK®2 ("Halogen-free") |
| <b>Final testing information</b>  |                            |
| Testing location                  | ST SHENZHEN - CHINA        |

|                                   | ESDALC6V1-5P6              |
|-----------------------------------|----------------------------|
| <b>Wafer/Die fab. information</b> |                            |
| Wafer fab manufacturing location  | ST TOURS - FRANCE          |
| Technology / Process family       | ASD - TRANSIL              |
| <b>Assembly information</b>       |                            |
| Assembly site                     | ST SUBCONTRACTOR - CHINA   |
| Package description               | SOT666                     |
| Molding compound                  | ECOPACK®2 ("Halogen-free") |
| <b>Final testing information</b>  |                            |
| Testing location                  | ST SUBCONTRACTOR - CHINA   |

|                                   | SMLVT3V3                   |
|-----------------------------------|----------------------------|
| <b>Wafer/Die fab. information</b> |                            |
| Wafer fab manufacturing location  | ST TOURS - FRANCE          |
| Technology / Process family       | TRANSIL                    |
| <b>Assembly information</b>       |                            |
| Assembly site                     | ST SUBCONTRACTOR - CHINA   |
| Package description               | SMB                        |
| Molding compound                  | ECOPACK®2 ("Halogen-free") |
| <b>Final testing information</b>  |                            |
| Testing location                  | ST SUBCONTRACTOR - CHINA   |

|                                   |                             |
|-----------------------------------|-----------------------------|
|                                   | <b>USBUF01W6</b>            |
| <b>Wafer/Die fab. information</b> |                             |
| Wafer fab manufacturing location  | ST TOURS - FRANCE           |
| Technology / Process family       | IPAD LINE FILTER            |
| <b>Assembly information</b>       |                             |
| Assembly site                     | ST SUBCONTRACTOR - MALAYSIA |
| Package description               | SOT323-6L                   |
| Molding compound                  | ECOPACK®2 ("Halogen-free")  |
| <b>Final testing information</b>  |                             |
| Testing location                  | ST SUBCONTRACTOR - MALAYSIA |

|                                   |                            |
|-----------------------------------|----------------------------|
|                                   | <b>ESDA25L</b>             |
| <b>Wafer/Die fab. information</b> |                            |
| Wafer fab manufacturing location  | ST TOURS - FRANCE          |
| Technology / Process family       | ASD - TRANSIL              |
| <b>Assembly information</b>       |                            |
| Assembly site                     | ST SUBCONTRACTOR - CHINA   |
| Package description               | SOT23-3L                   |
| Molding compound                  | ECOPACK®2 ("Halogen-free") |
| <b>Final testing information</b>  |                            |
| Testing location                  | ST SUBCONTRACTOR - CHINA   |

|                                   |                             |
|-----------------------------------|-----------------------------|
|                                   | <b>ESDA5V3SC6Y</b>          |
| <b>Wafer/Die fab. information</b> |                             |
| Wafer fab manufacturing location  | ST TOURS - FRANCE           |
| Technology / Process family       | ASD - TRANSIL               |
| <b>Assembly information</b>       |                             |
| Assembly site                     | ST SUBCONTRACTOR - MALAYSIA |
| Package description               | SOT23-6L                    |
| Molding compound                  | ECOPACK®2 ("Halogen-free")  |
| <b>Final testing information</b>  |                             |
| Testing location                  | ST SUBCONTRACTOR - MALAYSIA |

## 5 TESTS PLAN AND RESULTS SUMMARY

### 5.1 Test vehicles

| Lot # | Part Number      | Package   | Wafer fab location | Assy plant Location         | Comments                           |
|-------|------------------|-----------|--------------------|-----------------------------|------------------------------------|
| L1    | EMIF06-1005MX12Y | QFN-12L   | ST TOURS - FRANCE  | ST SUBCONTRACTOR - MALAYSIA | 1 <sup>st</sup> qualification lot  |
| L2    | ESDA6V1-5SC6Y    | SOT23-6L  |                    |                             | 2 <sup>nd</sup> qualification lot  |
| L3    | ESDA25SC6Y       | SOT23-6L  |                    |                             | 3 <sup>rd</sup> qualification lot  |
| L4    | EMIF03-SIM02M8   | QFN-8L    |                    | ST SUBCONTRACTOR - CHINA    | 4 <sup>th</sup> qualification lot  |
| L5    | ESDALC6V1-5P6    | SOT666    |                    |                             | 5 <sup>th</sup> qualification lot  |
| L6    | ESDA6V1U1RL      | SO-8      |                    | ST SHENZHEN – CHINA         | 6 <sup>th</sup> qualification lot  |
| L7    | USBUF01W6        | SOT323-6L |                    | ST SUBCONTRACTOR - MALAYSIA | 7 <sup>th</sup> qualification lot  |
| L8    | SMLVT3V3         | SMB       |                    | ST SUBCONTRACTOR - CHINA    | 8 <sup>th</sup> qualification lot  |
| L9    | ESDA19SC6        | SOT23-6L  |                    |                             | 9 <sup>th</sup> qualification lot  |
| L10   | ESDA6V1-5SC6Y    | SOT23-6L  |                    | ST SUBCONTRACTOR - MALAYSIA | 10 <sup>th</sup> qualification lot |
| L11   | ESDA19SC6        | SOT23-6L  |                    | ST SUBCONTRACTOR - CHINA    | 11 <sup>th</sup> qualification lot |
| L12   | ESDA25L          | SOT23-3L  |                    |                             | 12 <sup>th</sup> qualification lot |
| L13   | ESDA6V1-5SC6Y    | SOT23-6L  |                    | ST SUBCONTRACTOR - MALAYSIA | 13 <sup>th</sup> qualification lot |
| L14   | ESDA5V3SC6Y      | SOT23-6L  |                    |                             | 14 <sup>th</sup> qualification lot |

Detailed results in below chapter will refer to these references.

## 5.2 Test plan

| Stress                                          | Abrv  | 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. |         |                                                                                                                                                                                   | X         |
| Pre-conditioning                                | PC    | J-STD-020<br>JESD22-A113                                | All qualification parts tested per the requirements of the appropriate device specification. |         | As per targeted MSL<br>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                                                                                                                                   | X         |
| Parametric Verification                         | PV    | User specification                                      | L1, L2, L3<br>L6, L9, L14                                                                    | 6 * 30  |                                                                                                                                                                                   | X         |
| High Temperature Reverse Bias                   | HTRB  | MIL-STD-750-1<br>M1038 Method A                         | L1, L2, L4<br>L5, L6, L7<br>L8, L9, L10<br>L11, L12, L13                                     | 12 * 77 |                                                                                                                                                                                   | X         |
| AC blocking voltage                             | ACBV  | MIL-STD-750-1<br>M1040 Test condition A                 |                                                                                              |         | Required for Thyristor only.<br>Alternative to HTRB                                                                                                                               |           |
| High Temperature Forward Bias                   | HTFB  | JESD22 A-108                                            |                                                                                              |         | Not required, applicable only to LEDs<br>Alternative to HTRB                                                                                                                      |           |
| High Temperature Operating Life                 | HTOL  |                                                         |                                                                                              |         | Covered by HTRB or ACBV                                                                                                                                                           |           |
| Steady State Operational                        | SSOP  | MIL-STD-750-1<br>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                                             | L2, L3, L5<br>L8, L12                                                                        | 5 * 77  |                                                                                                                                                                                   | X         |
| Temperature Cycling Hot Test                    | TCHT  | JESD22A-104                                             |                                                                                              |         | Required for Power MOSFET – IGBT only.                                                                                                                                            |           |
| Temperature Cycling Delamination Test           | TCDT  | JESD22A-104<br>J-STD-035                                |                                                                                              |         | Required for Power MOSFET – IGBT only.<br>Alternative to TCHT                                                                                                                     |           |
| Wire Bond Integrity                             | WBI   | MIL-STD-750<br>Method 2037                              |                                                                                              |         | For dissimilar metal bonding systems only                                                                                                                                         |           |
| Unbiased Highly Accelerated Stress Test         | UHASt | JESD22A-118 or A101                                     | L3, L5, L12                                                                                  | 3 * 77  |                                                                                                                                                                                   | X         |
| 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, L3<br>L4, L5, L7<br>L8, L9, L10<br>L11, L12, L13                                     | 12 * 77 |                                                                                                                                                                                   | X         |
| High Temperature High Humidity Bias             | HTHHB | JED22A-101                                              |                                                                                              |         | Not required, LED only                                                                                                                                                            |           |
| Intermittent Operational Life / Thermal Fatigue | IOL   | MIL-STD-750<br>Method 1037                              |                                                                                              |         | For power devices. Not required for Transient Voltage Suppressor (TVS) parts                                                                                                      |           |
| Power and Temperature Cycle                     | PTC   | JED22A-105                                              |                                                                                              |         | For power devices. Not required for Transient Voltage Suppressor (TVS) parts<br>Perform PTC if $\Delta T_j > 100^\circ\text{C}$ cannot be achieved with IOL<br>Alternative to IOL |           |

| Stress                                     | Abv     | Reference                           | Lot                                     | SS     | Comments                                                                                                       | Test plan |
|--------------------------------------------|---------|-------------------------------------|-----------------------------------------|--------|----------------------------------------------------------------------------------------------------------------|-----------|
| ESD Characterization                       | ESD HBM | AEC Q101-001 and 005                | L1, L2<br>L3, L14                       | 242    |                                                                                                                | X         |
| ESD Characterization                       | ESD CDM | AEC Q101-001 and 005                |                                         |        |                                                                                                                |           |
| Destructive Physical Analysis              | DPA     | AEC-Q101-004 Section 4              | L1, L2                                  | 3 * 2  | After H3TRB and TC                                                                                             | X         |
| Physical Dimension                         | PD      | JESD22B-100                         |                                         |        |                                                                                                                |           |
| 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)      | L2, L12                                 | 2 * 30 |                                                                                                                | X         |
| Solderability                              | SD      | J-STD-002 JESD22B102                |                                         |        |                                                                                                                |           |
| 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             | L1, L2, L3<br>L4, L5, L6<br>L7, L9, L12 | 9 * 10 |                                                                                                                | X         |
| Bond Shear                                 | BS      | AEC-Q101-003                        | L1, L2, L3<br>L4, L5, L6<br>L7, L9, L12 | 9 * 10 |                                                                                                                | X         |
| Die Shear                                  | DS      | MIL-STD-750 Method 2017             | L1, L2, L3<br>L4, L5, L6<br>L7, L9, L12 | 9 * 5  |                                                                                                                | 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                    |                                         |        |                                                                                                                |           |
| 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)                    | PCsec   | MIL-STD750-1 Method1037             |                                         |        | AQG324 test for Modules                                                                                        |           |
| Power Cycling (minutes)                    | PCmin   | MIL-STD750-1 Method1037             |                                         |        | AQG324 test for Modules                                                                                        |           |
| Mechanical shock                           | MS      | IEC 600068-2-27                     |                                         |        | AQG324 test for Modules                                                                                        |           |
| Vibration                                  | V       | IEC60068-2-6                        |                                         |        | AQG324 test for Modules                                                                                        |           |

### 5.3 Results summary

Test performed as per AEC-Q101-Rev E guidelines.

| Test                          | P<br>C | Std ref.                     | Conditions                                                                                                     | Steps /<br>Duration | SS  | Failure/SS                        |      |      |      |      |      |      |      |      |      |      |      |      |
|-------------------------------|--------|------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------|-----|-----------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
|                               |        |                              |                                                                                                                |                     |     | L1                                | L2   | L3   | L4   | L5   | L6   | L7   | L8   | L9   | L10  | L11  | L12  | L13  |
| Pre- and Post-Electrical Test |        | ST datasheet                 | Vbr, Ir, Vf parameters following product datasheet                                                             | -                   | -   | 0/2524                            |      |      |      |      |      |      |      |      |      |      |      |      |
| External Visual               |        | JESD22 B-101                 | All qualification parts submitted for testing passed External & Visual inspection during manufacturing process |                     |     |                                   |      |      |      |      |      |      |      |      |      |      |      |      |
| Parametric Verification       |        | ST datasheet                 | Over part temperature range (note 1)                                                                           |                     | 180 | Refer to paragraph 6.1 in Annexes |      |      |      |      |      |      |      |      |      |      |      |      |
| HTRB                          | N      | MIL-STD-750-1 M1038 Method A | Tj=175°C<br>VR=100% VRRM                                                                                       | 1Khrs               | 77  |                                   |      |      |      |      |      |      | 0/77 |      |      |      |      |      |
| HTRB                          | N      | MIL-STD-750-1 M1038 Method A | Tj=150°C<br>VR=100% VRRM                                                                                       | 1Khrs               | 616 | 0/77                              | 0/77 |      |      |      |      | 0/77 |      | 0/77 | 0/77 | 0/77 | 0/77 | 0/77 |
| HTRB                          | N      | MIL-STD-750-1 M1038 Method A | Tj=125°C<br>VR=100% VRRM                                                                                       | 1Khrs               | 231 |                                   |      |      | 0/77 | 0/77 | 0/77 |      |      |      |      |      |      |      |
| TC                            | Y      | JESD22 A-104                 | -55/+150°C<br>2cy/h                                                                                            | 1Kcy                | 231 |                                   | 0/77 | 0/77 |      |      |      |      |      |      |      |      | 0/77 |      |
| TC                            | Y      | JESD22 A-104                 | -65/+150°C<br>2cy/h                                                                                            | 500cy               | 154 |                                   |      |      |      | 0/77 |      |      | 0/77 |      |      |      |      |      |
| UHASt                         | Y      | JESD22 A-118                 | 130°C; 85% RH<br>2.3bar                                                                                        | 96hrs               | 231 |                                   |      | 0/77 |      | 0/77 |      |      |      |      |      |      | 0/77 |      |
| H3TRB                         | Y      | JESD22 A-101                 | 85°C; 85% RH<br>VR=100% VRRM                                                                                   | 1Khrs               | 924 | 0/77                              | 0/77 | 0/77 | 0/77 | 0/77 |      | 0/77 | 0/77 | 0/77 | 0/77 | 0/77 | 0/77 | 0/77 |
| ESD                           |        | AEC-Q101-001                 | HBM                                                                                                            | -                   | 242 | Refer to paragraph 6.2 in Annexes |      |      |      |      |      |      |      |      |      |      |      |      |
| DPA                           |        | AEC-Q101-004                 | After TC 1Kcy                                                                                                  | -                   | 2   |                                   | 0/2  |      |      |      |      |      |      |      |      |      |      |      |
|                               |        |                              | After H3TRB 1Khrs                                                                                              | -                   | 4   | 0/2                               | 0/2  |      |      |      |      |      |      |      |      |      |      |      |
| RSH                           | N      | JESD22 A-111                 | 85%RH / 85°C<br>168hrs<br>Dipping 260°C-10s                                                                    | -                   | 60  |                                   | 0/30 |      |      |      |      |      |      |      |      |      | 0/30 |      |
| WBS                           |        | MIL-STD-750 Method 2037      | 10 bond minimum                                                                                                | -                   | 90  | 0/10                              | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 |      | 0/10 |      |      | 0/10 |      |
| BS                            |        | AEC-Q101-003                 | 10 bond minimum                                                                                                | -                   | 90  | 0/10                              | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 |      | 0/10 |      |      | 0/10 |      |
| DS                            |        | MIL-STD-750 Method 2017      | -                                                                                                              | -                   | 45  | 0/5                               | 0/5  | 0/5  | 0/5  | 0/5  | 0/5  | 0/5  |      | 0/5  |      |      | 0/5  |      |

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

#### ➤ ESDA25SC6Y

| Characterization ESDA25SC6Y        |                      |          |                      |                       |                      |
|------------------------------------|----------------------|----------|----------------------|-----------------------|----------------------|
| Date: 04/06/2026                   |                      |          |                      |                       |                      |
| Ref: 24683A                        |                      |          |                      |                       |                      |
| Lab: ST Tours Characterization Lab |                      |          |                      |                       |                      |
| TEST                               | VBR                  | IR       | $\alpha T$           | VF                    | VCL                  |
| EQUIPEMENT                         | TSA_491              | TSA_491  | TSA_491              | TSA_491               | TSA_491              |
| Condition 1                        | 25°C                 | 25°C     | 25°C                 | 25°C                  | 25°C                 |
| Condition 2                        | I <sub>r</sub> = 1mA | VR=24V   | I <sub>r</sub> = 1mA | I <sub>f</sub> = 10mA | I <sub>pp</sub> = 9A |
| Condition 3                        | On Pin 1             | On Pin 1 | On Pin 1             | On Pin 1              | On Pin 1             |
| Min. Datasheet                     | 25                   |          |                      |                       |                      |
| Typ. Datasheet                     |                      |          |                      |                       |                      |
| Max. Datasheet                     | 30                   | 1        | 10                   | 1.2                   | 51                   |
| UNIT                               | V                    | μA       | 10-4/°C              | V                     | V                    |
| N                                  | 30                   | 30       | 30                   | 30                    | 5                    |
| Min.                               | 27.13                | 0.002    | 8.25                 | 0.88                  | 40.06                |
| Max.                               | 27.76                | 0.002    | 8.55                 | 0.90                  | 40.85                |
| Avg.                               | 27.49                | 0.002    | 8.42                 | 0.89                  | 40.51                |

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.

#### ➤ ESDA5V3SC6Y

| Characterization ESDA5V3SC6Y       |                      |          |                      |                        |                       |
|------------------------------------|----------------------|----------|----------------------|------------------------|-----------------------|
| Date: 31/03/2026                   |                      |          |                      |                        |                       |
| Ref: 24690A                        |                      |          |                      |                        |                       |
| Lab: ST Tours Characterization Lab |                      |          |                      |                        |                       |
| TEST                               | VBR                  | IR       | $\alpha T$           | VF                     | VCL                   |
| EQUIPEMENT                         | TSA_491              | TSA_491  | TSA_491              | TSA_491                | TSA_491               |
| Condition 1                        | 25°C                 | 25°C     | 25°C                 | 25°C                   | 25°C                  |
| Condition 2                        | I <sub>r</sub> = 1mA | VR=3V    | I <sub>r</sub> = 1mA | I <sub>f</sub> = 200mA | I <sub>pp</sub> = 22A |
| Condition 3                        | On Pin 1             | On Pin 1 | On Pin 1             | On Pin 1               | On Pin 1              |
| Min. Datasheet                     | 5.3                  |          |                      |                        |                       |
| Typ. Datasheet                     |                      |          |                      |                        |                       |
| Max. Datasheet                     | 5.9                  | 2        | 5                    | 1.25                   | 21                    |
| UNIT                               | V                    | μA       | 10-4/°C              | V                      | V                     |
| N                                  | 30                   | 30       | 30                   | 30                     | 5                     |
| Min.                               | 5.50                 | 0.313    | 2.25                 | 0.99                   | 12.24                 |
| Max.                               | 5.65                 | 0.143    | 2.65                 | 1.02                   | 12.52                 |
| Avg.                               | 5.56                 | 0.472    | 2.51                 | 1.01                   | 12.38                 |

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.

## ➤ EMIF06-1005MX12Y

| Characterization EMIF06-1005MX12Y  |                      |          |                       |                       |                         |
|------------------------------------|----------------------|----------|-----------------------|-----------------------|-------------------------|
| Date: 05/05/2026                   |                      |          |                       |                       |                         |
| Ref: 24691A                        |                      |          |                       |                       |                         |
| Lab: ST Tours Characterization Lab |                      |          |                       |                       |                         |
| TEST                               | VBR                  | IRM      | VF                    | RI/O                  | Cline                   |
| EQUIPEMENT                         | TSA_491              | TSA_491  | TSA_491               | TSA_491               | TSA_491                 |
| Condition 1                        | 25°C                 | 25°C     | 25°C                  | 25°C                  | 25°C                    |
| Condition 2                        | I <sub>r</sub> = 1mA | VRM=3V   | I <sub>f</sub> = 10mA | I <sub>r</sub> = 20mA | V <sub>osc</sub> = 30mV |
| Condition 3                        |                      |          |                       |                       | f=1MHz                  |
| Condition 4                        | On Pin 1             | On Pin 1 | On Pin 1              | On I/O1 & I/O12       | On Pin 1/GND            |
| Min. Datasheet                     | 6                    |          | 0.5                   | 90                    | 38                      |
| Typ. Datasheet                     | 8                    |          | 1                     | 100                   | 45                      |
| Max. Datasheet                     | 10                   | 200      | 1.5                   | 110                   | 52                      |
| UNIT                               | V                    | nA       | V                     | V                     | pF                      |
| N                                  | 30                   | 30       | 30                    | 30                    | 6                       |
| Min.                               | 7.29                 | 4.22     | 0.85                  | 96.83                 | 40.58                   |
| Max.                               | 7.42                 | 5.28     | 0.86                  | 98.78                 | 41.28                   |
| Avg.                               | 7.36                 | 4.77     | 0.85                  | 97.84                 | 40.88                   |

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.

## ➤ ESDA6V1-5SC6Y

| Characterization ESDA6V1-5SC6Y     |                      |          |                      |                        |                      |
|------------------------------------|----------------------|----------|----------------------|------------------------|----------------------|
| Date: 23/06/2026                   |                      |          |                      |                        |                      |
| Ref: 24804A                        |                      |          |                      |                        |                      |
| Lab: ST Tours Characterization Lab |                      |          |                      |                        |                      |
| TEST                               | VBR                  | IR       | αT                   | VF                     | VCL                  |
| EQUIPEMENT                         | TSA_491              | TSA_491  | TSA_491              | TSA_491                | TSA_491              |
| Condition 1                        | 25°C                 | 25°C     | 25°C                 | 25°C                   | 25°C                 |
| Condition 2                        | I <sub>r</sub> = 1mA | VR=5.2V  | I <sub>r</sub> = 1mA | I <sub>f</sub> = 200mA | I <sub>pp</sub> = 7A |
| Condition 3                        | On Pin 1             | On Pin 1 | On Pin 1             | On Pin 1               | On Pin 1             |
| Min. Datasheet                     | 6.1                  |          |                      |                        |                      |
| Typ. Datasheet                     |                      |          |                      |                        |                      |
| Max. Datasheet                     | 7.2                  | 1        | 6                    | 1.25                   | 11.4                 |
| UNIT                               | V                    | μA       | 10-4/°C              | V                      | V                    |
| N                                  | 30                   | 30       | 30                   | 30                     | 5                    |
| Min.                               | 6.69                 | 0.036    | 4.55                 | 1.00                   | 10.77                |
| Max.                               | 6.77                 | 0.204    | 4.79                 | 1.01                   | 10.92                |
| Avg.                               | 6.72                 | 0.059    | 4.67                 | 1.00                   | 10.85                |

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.

## ➤ ESDA6V1U1RL

| Characterization ESDA6V1U1RL       |                      |          |                      |                        |
|------------------------------------|----------------------|----------|----------------------|------------------------|
| Date: 14/04/2026                   |                      |          |                      |                        |
| Ref: 24684A                        |                      |          |                      |                        |
| Lab: ST Tours Characterization Lab |                      |          |                      |                        |
| TEST                               | VBR                  | IRM      | αT                   | VF                     |
| EQUIPEMENT                         | TSA_491              | TSA_491  | TSA_491              | TSA_491                |
| Condition 1                        | 25°C                 | 25°C     | 25°C                 | 25°C                   |
| Condition 2                        | I <sub>r</sub> = 1mA | VRM=5V   | I <sub>r</sub> = 1mA | I <sub>f</sub> = 200mA |
| Condition 3                        | On Pin 1             | On Pin 1 | On Pin 1             | On Pin 1               |
| Min. Datasheet                     | 6.1                  |          |                      |                        |
| Typ. Datasheet                     |                      |          |                      |                        |
| Max. Datasheet                     | 7.2                  | 2        | 6                    | 1.5                    |
| UNIT                               | V                    | μA       | 10-4/°C              | V                      |
| N                                  | 30                   | 30       | 30                   | 30                     |
| Min.                               | 6.71                 | 0.009    | 3.99                 | 0.93                   |
| Max.                               | 6.96                 | 0.305    | 4.56                 | 0.93                   |
| Avg.                               | 6.86                 | 0.047    | 4.31                 | 0.93                   |

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.

➤ **ESDA19SC6**

| Characterization ESDA19SC6         |                      |          |          |                      |                       |
|------------------------------------|----------------------|----------|----------|----------------------|-----------------------|
| Date: 05/05/2026                   |                      |          |          |                      |                       |
| Ref: 24805A                        |                      |          |          |                      |                       |
| Lab: ST Tours Characterization Lab |                      |          |          |                      |                       |
| TEST                               | VBR                  | IRM      | VCL      | $\alpha T$           | VF                    |
| EQUIPEMENT                         | TSA_491              | TSA_491  | TSA_491  | TSA_491              | TSA_491               |
| Condition 1                        | 25°C                 | 25°C     | 25°C     | 25°C                 | 25°C                  |
| Condition 2                        | I <sub>r</sub> = 1mA | VRM=15V  | IPP=13A  | I <sub>r</sub> = 1mA | I <sub>f</sub> = 10mA |
| Condition 3                        | On Pin 1             | On Pin 1 | On Pin 1 | On Pin 1             | On Pin 1              |
| Min. Datasheet                     | 19                   |          |          |                      |                       |
| Typ. Datasheet                     |                      |          |          |                      |                       |
| Max. Datasheet                     | 21                   | 0.1      | 39       | 8.5                  | 1.2                   |
| UNIT                               | V                    | μA       | V        | 10-4/°C              | V                     |
| N                                  | 30                   | 30       | 5        | 30                   | 30                    |
| Min.                               | 19.38                | 0.002    | 30.03    | 7.61                 | 0.81                  |
| Max.                               | 19.73                | 0.003    | 30.52    | 8.00                 | 0.83                  |
| Avg.                               | 19.54                | 0.002    | 30.29    | 7.77                 | 0.82                  |

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.

## 6.2 **ESD**

➤ **ESDA25SC6Y**

| TEST        | ISO 10605 CONTACT |
|-------------|-------------------|
| EQUIPEMENT  | ESS_S3011A        |
| Condition 1 | 25°C              |
| Condition 2 | C = 330 pF        |
| Condition 3 | R = 330 Ω         |
| UNIT        | kV                |
| N           | 30                |
| Min.        | > 30              |
| Max.        | > 30              |

➤ **ESDA5V3SC6Y**

| TEST        | ISO 10605 CONTACT |
|-------------|-------------------|
| EQUIPEMENT  | ESS_S3011A        |
| Condition 1 | 25°C              |
| Condition 2 | C = 330 pF        |
| Condition 3 | R = 330 Ω         |
| UNIT        | kV                |
| N           | 20                |
| Min.        | > 30              |
| Max.        | > 30              |

➤ **EMIF06-1005MX12Y**

| TEST        | ISO IEC61000 CONTACT | ISO 10605 CONTACT |
|-------------|----------------------|-------------------|
| EQUIPEMENT  | ESS_S3011A           | ESS_S3011A        |
| Condition 1 | 25°C                 | 25°C              |
| Condition 2 | C = 150 pF           | C = 330 pF        |
| Condition 3 | R = 330 Ω            | R = 330 Ω         |
| UNIT        | kV                   | kV                |
| N           | 36                   | 36                |
| Min.        | > 15                 | > 11              |
| Max.        | > 15                 | > 11              |

➤ **ESDA6V1-5SC6Y**

| TEST        | IEC61000-4-2 CONTACT | IEC61000-4-2 AIR | ISO 10605 CONTACT | ISO 10605 AIR |
|-------------|----------------------|------------------|-------------------|---------------|
| EQUIPEMENT  | ESS_S3011A           | ESD_NX30         | ESS_S3011A        | ESD_NX30      |
| Condition 1 | 25°C                 | 25°C             | 25°C              | 25°C          |
| Condition 2 | C = 150 pF           | C = 150 pF       | C = 330 pF        | C = 330 pF    |
| Condition 3 | R = 330 Ω            | R = 330 Ω        | R = 330 Ω         | R = 330 Ω     |
| UNIT        | kV                   | kV               | kV                | kV            |
| N           | 30                   | 30               | 30                | 30            |
| Min.        | > 18                 | > 30             | > 13              | > 20          |
| Max.        | > 18                 | > 30             | > 13              | > 20          |

## 6.3 Tests description

| Test name                                                   | Description                                                                                                                                                                                                                                                                                                                                                                                                   | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Die Oriented</b>                                         |                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>HTRB</b><br>High Temperature Reverse Bias                | The device is stressed in static configuration, trying to satisfy as much as possible the following conditions: <ul style="list-style-type: none"> <li>- Low power dissipation</li> <li>- Max. supply voltage compatible with diffusion process and internal circuitry limitations.</li> </ul> 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.<br>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.<br>To assess active area and contacts integrity |
| <b>Package Oriented</b>                                     |                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>PC</b><br>Preconditioning                                | The device is submitted to a typical temperature profile used for surface mounting devices, after a controlled moisture absorption.                                                                                                                                                                                                                                                                           | As stand-alone test: to investigate the moisture sensitivity level.<br>As preconditioning before other reliability tests: to verify that the surface mounting stress does not impact on the subsequent reliability performance. The typical failure modes are "pop-corn" effect and delamination.                                                                                                                                                  |
| <b>DPA</b><br>Destructive Physical Analysis                 | Specific construction analysis on random parts that have successfully completed THB or TC.                                                                                                                                                                                                                                                                                                                    | To investigate on reliability stresses impact on delamination, corrosion and product construction integrity.                                                                                                                                                                                                                                                                                                                                       |
| <b>H3TRB</b><br>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.                                                                                                                                                                                                                                                                                                           |
| <b>TC</b><br>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.                                                                                                              |
| <b>UHAST</b><br>Unbiased Highly Accelerated Stress Test     | The device is stored in saturated steam, at fixed and controlled conditions of pressure and temperature.                                                                                                                                                                                                                                                                                                      | To investigate corrosion phenomena affecting die or package materials, related to chemical contamination and package hermeticity.                                                                                                                                                                                                                                                                                                                  |
| <b>RSH</b><br>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.                                                                                                                                                                                                                                                                                                                                         |
| <b>WBS</b><br>Wire Bond Strength                            | To apply the specified stress to the bond, lead wire, or terminal.                                                                                                                                                                                                                                                                                                                                            | To measure bond strength, evaluate bond strength distributions, or to determine compliance with specified bond strength requirements of the applicable acquisition document. This test may be applied to the wire-to-die bond, wire-to-substrate bond, or the wire-to-package lead bond inside the package of wire-connected microelectronic devices bonded by soldering, thermo-compression, ultrasonic, or related techniques                    |

| Test name               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Purpose                                                                                                  |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| <b>BS</b><br>Bond Shear | <p>This test establishes a procedure for determining the strength of the interface between a gold ball bond and a die bonding surface, or an aluminum wedge/stitch bond and a die or package bonding surface, on either pre-encapsulation or post-encapsulation components. This strength measurement is extremely important in determining two features:</p> <ol style="list-style-type: none"> <li>1) the integrity of the metallurgical bond which has been formed.</li> <li>2) the reliability of gold and aluminum wire bonds to die or package bonding surfaces.</li> </ol> <p>This test method can be used only when the ball height and diameter for ball bonds, or the wire height (1.25 mil and larger at the compressed bond area) for wedge/stitch bonds, are large enough and adjacent interfering structures are far enough away to allow suitable placement and clearance (e.g., above the bonding</p> | To check the integrity of the metallurgical bond.                                                        |
| <b>DS</b><br>Die Shear  | A sufficient force to shear the die from its mounting shall be applied to the die.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | To establish the integrity of the semiconductor die attachment to the package header or other substrate. |