DAT-P-002/91-02

Center for Quality Engineering

Test Report No.: B0JA0002

Order No.: B0JA **Pages:** 10 **Munich,** Sep 12, 2008

Client:	Infineon Technologies AG OP TTR RPT 2
Equipment Under Test:	D1428A ESD5V3U4RRS
Manufacturer:	Infineon Technologies AG
Task:	Identification of compliance with the requirements mentioned below:
Test Specifications: [covered by accreditation]	Burst test according to EN 61000-4-4: 2004 Surge test according to EN 61000-4-5: 1995 + A1:2001
Result:	Requirements of the above mentioned specifications are fulfilled for all test levels. EN 61000-4-4: withstand voltage 2500 V EN 61000-4-5: withstand current 3 A

The results relate only to the items tested as described in this test report.

edited by:	**Date**	**Signature**
Schmiedl Qualification Engineer	Sep 12, 2008	
approved by:	**Date**	**Signature**
Bauer Manager EMC	Sep 12, 2008	

This document was signed electronically.

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CONTENTS

1 Summary

Burst- und Surge-Tests according to customer specification were performed at the following type of diode:

- ESD5V3U4RRS

1.1 Burst-Test according to EN 61000-4-4

- Test of pins 2-5, 4-5 and 6-5 of each diode separately[1]
  – each 9 diodes ESD5V3U4RRS per voltage level (8 for 2 kV and 2.5 kV).

Voltage	Impulse	Duration	Frequency	Result
±1000 V	5/50 ns	1 min.	5 kHz	passed
±2000 V	5/50 ns	1 min.	5 kHz	passed
±2500 V	5/50 ns	1 min.	5 kHz	passed

Remark: Functional test after the Burst tests is passed for all test levels.

1.2 Surge-Test according to EN 61000-4-5

- Test of pins 2-5, 4-5 and 6-5 of each diode separately[1]
  – each 9 diodes ESD5V3U4RRS per current level

Current	Impulse	Number of Surges	Repetition Rate	Result
±1.0 A	8/20 µs	10, alternating	1 surge / min.	passed
±2.0 A	8/20 µs	10, alternating	1 surge / min.	passed
±3.0 A	8/20 µs	10, alternating	1 surge / min.	passed

Remark: Functional test after the Surge tests is passed for all test levels.

[1] Because of the symmetrical design the customer decided to do the tests without the pins 1-5 and pins 3-5.

DATech Deutsche Akkreditierungsstelle Technik in der TGA GmbH
Signatory of the Multilateral Agreement of EA and ILAC for the mutual recognition

represented in the

Deutschen AkkreditierungsRat

Akkreditierung

The **TGA GmbH,** represented by the **DATech Deutsche Akkreditierungsstelle Technik in der TGA GmbH**, confirms that the Testing Laboratory

SGS Germany GmbH KG
SGS CQE
Hofmannstraße 51
D- 81379 München

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out testing in the fields of

Mobile Radio Communication (base stations), Signaling System No. 7, Signaling Voice over IP, Interfaces of Telecommunication Equipment, Electromagnetical Compatibility (EMC), Safety of Electrical Appliances, Electromechanical Components, Passive Fiber Optic Components, Low-voltage Switchgear and Controlgear Assemblies, Safety of Machinery, Functional Safety of electronic/programmable electronic safety related systems, Basic Environmental Testing Procedures

according to the annexed list of standards and specifications.

The accreditation is valid until: **December 14th , 2009**

The annex is deemed part of this certificate and comprises **51** pages.

DAR-Registration No.: **DAT-P-002/91-02**

Frankfurt/Main, 01.06.2008

Correctness of the english translation confirmed: Frankfurt/Main, 01.06.2008

i.V. Dipl.-Ing.(FH) R. Egner
Head of the Accreditation Body

Member in EA, ILAC, IAF

Translation for information purposes only. The German Accreditation Certificate is authoritative

See notes overleaf

2 References

2.1 Specifications

EN 61000-4-4: 2004
EN 61000-4-5: 1995 + A1:2001

2.2 Bibliographical Data

None

3 General Information

3.1 Identification of Client

Infineon Technologies AG
OP TTR RPT 2
Wernerwerkstr. 2
93049 Regensburg
Martina Miethe

3.2 Test Laboratory

Center for Quality Engineering
SGS Germany GmbH
Hofmannstraße 50
81379 München

3.3 Time Schedule

Delivery of EUT: Aug 29, 2008
Start of test: Sep 03, 2008
End of test: Sep 09, 2008

3.4 Participants

Name	Function	Phone	E-Mail
Frank Schmiedl	Accredited testing, Editor	+49 89 722 23167	frank.schmiedl@sgs.com
Klaus Hänig	Accredited testing	+49 89 722 29641	klaus.haenig@sgs.com

4 Equipment Under Test

EUT:

Type:	ESD5V3U4RRS
Die Name:	D1428A
Charge/Lot:	RU822527-01
Package:	SOT 363-6-4

The diodes are assembled to each 3 pieces on 18 PCBs SOT 363-6-4, which are marked with p57E #1…9 (samples for burst tests) and p57F #1…9 (samples for surge tests).

The CQE internal numbering of diodes on the PCB is given in the following picture.

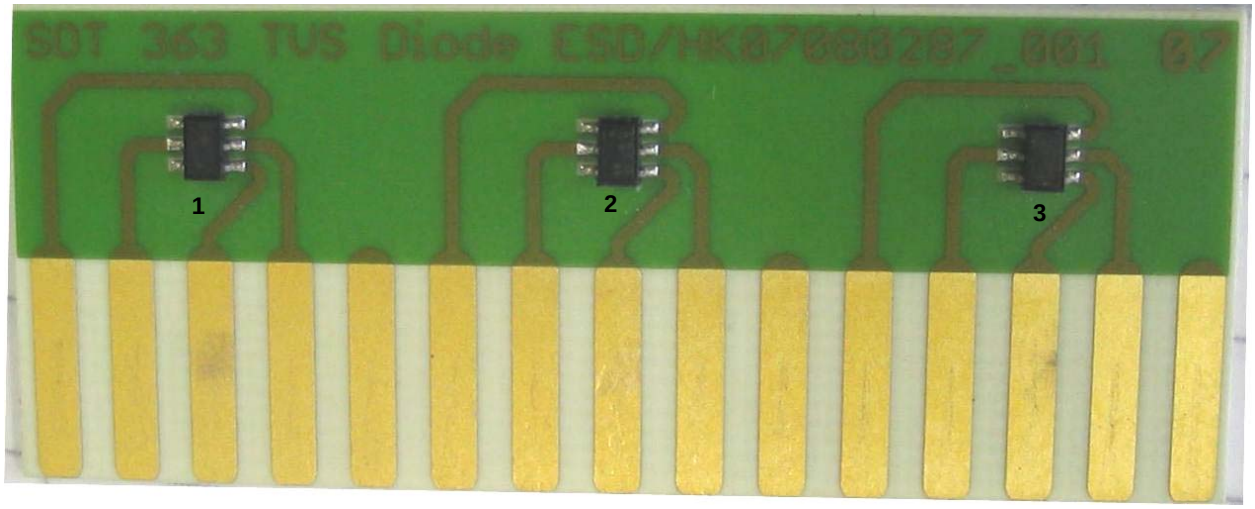


Figure 4-1: Diodes on the PCB

5 Test Equipment

5.1 Test Facility

The surge tests were performed in the Laboratory of Overvoltage, SGS CTS CQE CoC1. The burst tests were performed in the Laboratory of EMC, SGS CTS CQE CoC1.

The following table shows the environmental conditions:

Ambient temperature	Relative humidity	Barometric pressure
22 °C – 26 °C	40 % – 60 %	100 kPa – 102 kPa

5.2 Measuring Equipment

Label	Equipment	Type	Specifications / Remarks	Calibration		
				State	Last	Next
P0595	Burst Generator	SFT 4000	230 V / 16 A, programmable / 0.2 - 4.4 kV, 0.1 - 500 kHz Rep.	cal	03 / 2006	03 / 2009
N0259	Oscilloscope	9374M	1 GHz, printer, disk	cal	04 / 2008	04 / 2009
N0401	Current Probe	411	50 Ω ; 1 Hz - 20 MHz; 5 kA_{pk}; 50 A_{rms}	cal	04 / 2008	04 / 2010
N0560	Voltage probe	PP 002	10 MOhm; 14 pF; 350 MHz	ind		
N0327	Impulse Generator	CWG 10-703	1.2/50 µs; 8/20 µs; 0 - 10 kV; 1 Ω / 2 Ω	chk	04 / 2008	04 / 2010
N0767	Coupling Network	–	12x 100 Ω	cnn		
N0871	Coupling Network	–	16x 8.3 Ω *(8x 8.3 Ω used in parallel)*	cnn		

5.3 Measurement Uncertainty

As far as the underlying standards include requirements concerning the uncertainty of measuring instruments or measuring methods, they are met.

The expanded measurement uncertainty of the measuring chain was calculated for all tests according to the “ISO Guide to the expression of uncertainty in measurement (GUM)”. The results are documented in an “internal controlled document” at CQE archives.

The measuring accuracy for all measuring devices is given in their technical description. The measuring instruments, including any accessories, are calibrated respectively verified to ensure the necessary accuracy. Depending on the kind of measuring equipment it is checked within regular intervals or directly before the measurement is performed. Adjustments are made and correction factors applied to measured data in accordance with the specifications of the specific instrument.

The expanded measurement instrumentation uncertainty of our Test Laboratory meets the requirements of IEC CISPR 16-4-2 (2003-11) “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements” for all listed tests.

6 Test Specifications and Results

The test results in the report refer exclusively to the test object described in section 4 and the test period in section 3.3.

6.1 Burst-Test

- Test-Setup according to specification EN 61000-4-4 (refer to Figure 6-1)
  - – Test of 9 samples (PCBs; each PCB contains 3 pieces of diode ESD5V3U4RRS).
  - – Test of pins 2-5, 4-5 and 6-5 separately.[2]
  - – Test of 9 diodes per voltage level.
  - – Test of each diode separately.

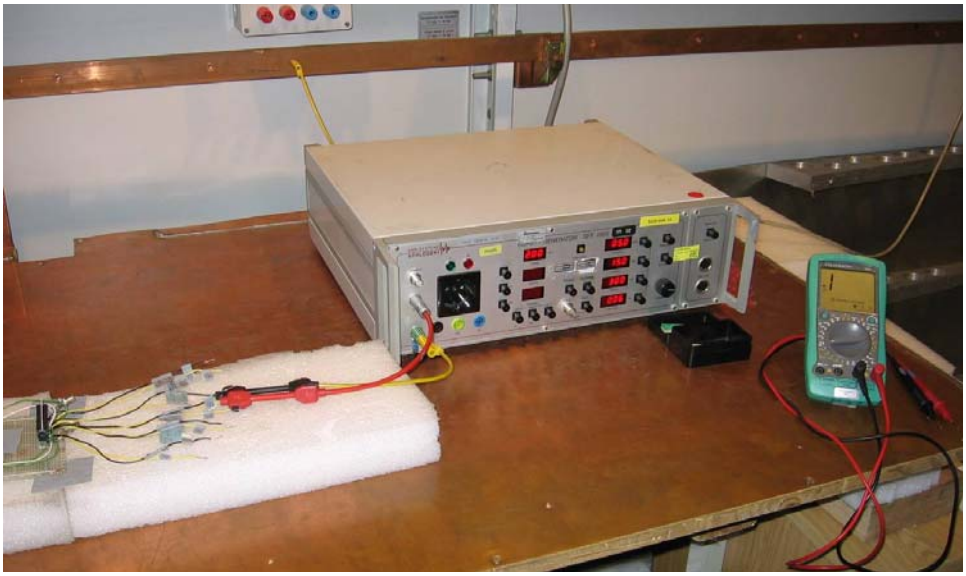


Figure 6-1: Test-Setup for the Burst tests

Result

Voltage	Impulse	Duration	Frequency	Piece	Failure
±1000 V	5/50 ns	1 min.	5 kHz	9	0
±2000 V	5/50 ns	1 min.	5 kHz	8	0
±2500 V	5/50 ns	1 min.	5 kHz	8	0

Remark: Functional test after the burst tests is passed for all diodes. No change in the parameters occurred before and after the test.

Due to an initial wrong test setup (tests performed on pins 4-2, 5-2 and 6-2) the diodes #1 on PCBs #4 (sample for 2 kV) and #8 (sample for 2.5 kV) showed short circuits. All other tests were performed with the correct pin combination as defined by the customer.

[2] Because of the symmetrical design the customer decided to do the tests without the pins 1-5 and pins 3-5.

6.2 Surge-Test

- Test-Setup according to specification EN 61000-4-5

  – Test of 9 samples (PCBs; each PCB contains 3 pieces of diode ESD5V3U4RRS).
  – Test of pins 2-5, 4-5 and 6-5 separately.[3]
  – Test of 9 diodes per voltage level.
  – Test of each diode separately.

Result

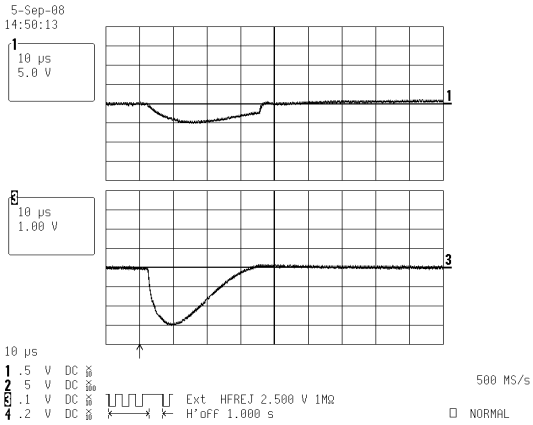
Current	Impulse	Repetition Rate	Number of Surges	Piece	Failure
1.0 A	8/20 µs	1 surge / min.	10, alternating	9	0
2.0 A	8/20 µs	1 surge / min.	10, alternating	9	0
3.0 A	8/20 µs	1 surge / min.	10, alternating	9	0

Remark: Functional test after the surge tests was passed for all diodes. No change in the parameters occurred before and after the test.

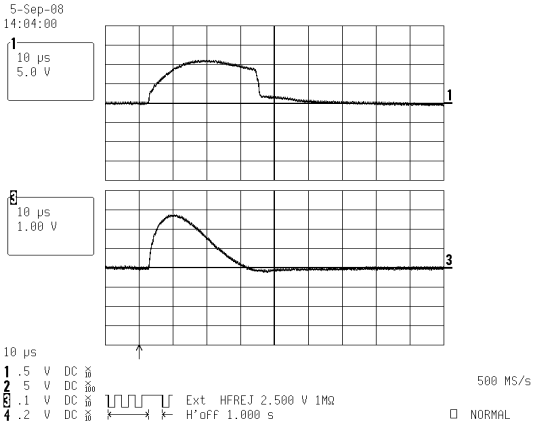
[3] Because of the symmetrical design the customer decided to do the tests without the pins 1-5 and pins 3-5.

7 Enclosure

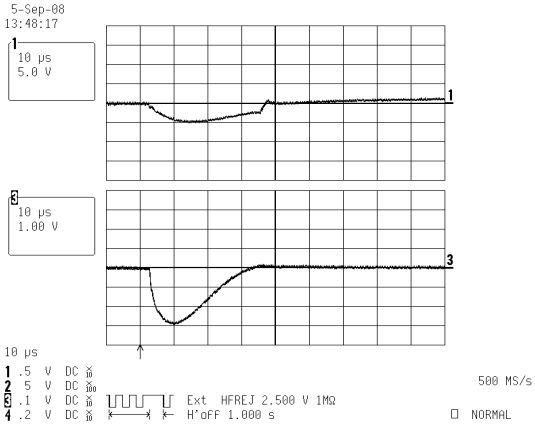
The following oscillograms show samples the applied current surges of wave shape 8/20 µs and the voltage drop across the tested diodes.



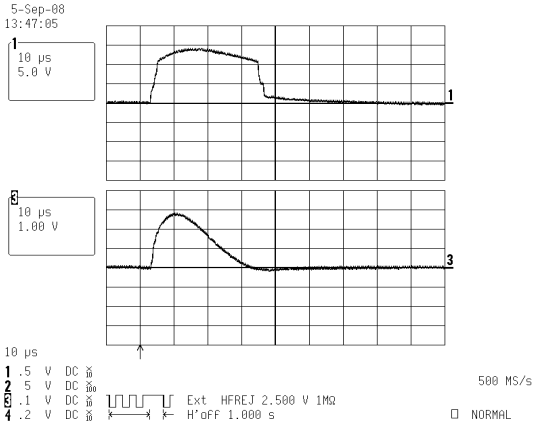
Ch 1: Voltage drop across the diode pin 2 - 5
Ch 3: Current Surge -3 A, wave shape 8/20 µs



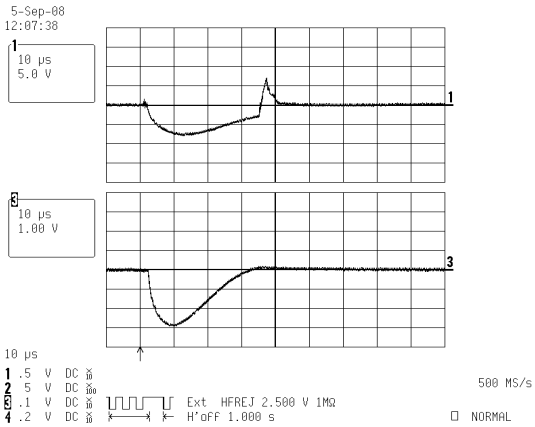
Ch 1: Voltage drop across the diode pin 2 - 5
Ch 3: Current Surge +3 A, wave shape 8/20 µs



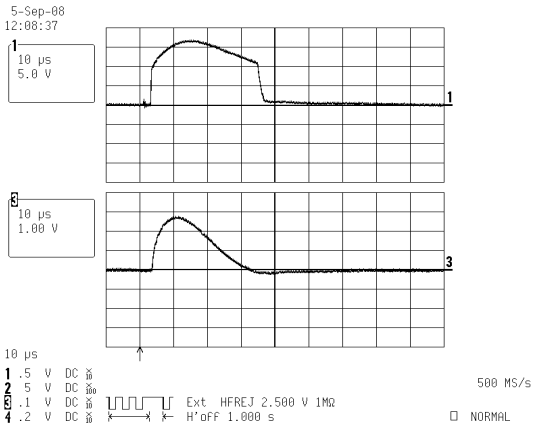
Ch 1: Voltage drop across the diode pin 4 - 5
Ch 3: Current Surge -3 A, wave shape 8/20 µs



Ch 1: Voltage drop across the diode pin 4 - 5
Ch 3: Current Surge +3 A, wave shape 8/20 µs



Ch 1: Voltage drop across the diode pin 4 - 5
Ch 3: Current Surge -4 A, wave shape 8/20 µs



Ch 1: Voltage drop across the diode pin 4 - 5
Ch 3: Current Surge +4 A, wave shape 8/20 µs

The peak forward voltages are in the range from 5 V up to 7 V approximately.
The break through voltages are in the range from 10 V up to 17 V approximately.