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**Integrated circuits –
EMC evaluation of CAN transceivers**

Withdrawn



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CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	7
4 Measurements and tests.....	7
4.1 General.....	7
4.2 RF and transient tests	8
4.3 ESD	35
5 Test report.....	39
Annex A (informative) Test circuit boards.....	40
Annex B (informative) Documentation of test results	42
Bibliography.....	44
Figure 1 – Overview of a minimum configuration of a CAN system for emission and immunity tests against transient and RF disturbances.....	9
Figure 2 – Example of the circuit diagram of the minimum network for a CAN high speed system for measuring emission and immunity in respect to RF disturbances and transients.....	10
Figure 3 – Example of the circuit diagram of the minimum network for a CAN low speed system for measuring emission and immunity in respect to RF disturbances and transients.....	11
Figure 4 – Example of the circuit diagram of the minimum network for a CAN high speed system for measuring the emission of RF disturbances	15
Figure 5 – Example of the circuit diagram of the minimum network for a CAN low speed system for measuring the emission of RF disturbances.....	16
Figure 6 – Test set-up for measurement of RF disturbances on the bus lines.....	18
Figure 7 – Decoupling network for emission measurement at CAN_High and CAN_Low in the frequency domain.....	18
Figure 8 – Example of the circuit diagram of the minimum network for a CAN high speed system for testing the RF immunity.....	21
Figure 9 – Example of the circuit diagram of the minimum network for a CAN low speed system for testing the RF immunity	22
Figure 10 – Test set-up for DPI measurements	24
Figure 11 – Coupling network for DPI measurements on bus lines	25
Figure 12 – RF monitoring network for DPI measurements of bus lines.....	25
Figure 13 – Coupling network for DPI measurements on V_{Bat}	25
Figure 14 – RF monitoring network for DPI measurements of V_{Bat}	26
Figure 15 – Coupling network for DPI measurements on wake-up.....	26
Figure 16 – RF monitoring network for DPI measurements of wake-up.....	26
Figure 17 – Example of the circuit diagram of the minimum network for a CAN high speed system for testing the transient immunity.....	29
Figure 18 – Example of the circuit diagram of the minimum network for a CAN low speed system for testing the transient immunity.....	30

Figure 19 – Test set-up for direct capacitive impulse coupling	32
Figure 20 – Coupling network for direct capacitive impulse coupling on CAN_High and CAN_Low	33
Figure 21 – Coupling network for direct capacitive impulse coupling on V_{Bat}	33
Figure 22 – Coupling network for direct capacitive impulse coupling on wake-up	33
Figure 23 – Circuit diagram of the test set-up for ESD measurements at CAN high speed transceivers	36
Figure 24 – Circuit diagram of the test set-up for ESD measurements at CAN low speed transceivers	36
Figure 25 – Test set-up for ESD measurements	37
Figure 26 – Coupling network for ESD measurements on bus lines, V_{Bat} and wake-up	38
Figure A.1 – Example of IC interconnections of CAN high and CAN low	40
Figure B.1 – Example of presentation of emission test results in the frequency domain	42
Figure B.2 – Example of presentation of DPI test results	43
Table 1 – Overview of requested measurements and tests	7
Table 2 – General test conditions	8
Table 3 – Communication test signal TX1	13
Table 4 – Communication test signal TX2	13
Table 5 – Basic scheme for immunity evaluation	14
Table 6 – Boundary values for normal IC operation	14
Table 7 – Overview of decoupling ports for emission	17
Table 8 – Parameters for emission test in the frequency domain	19
Table 9 – Settings of the measurement device for measurement of emission in the frequency domain	20
Table 10 – Overview of coupling ports	23
Table 11 – Specifications for DPI measurements	27
Table 12 – Required DPI measurements for function test	28
Table 13 – Combination of resistors for coupling on DPI measurements	28
Table 14 – Overview of coupling ports	31
Table 15 – Parameters for functional test	34
Table 16 – Required impulse tests for functioning	34
Table 17 – Parameters for impulse test (damage test)	35
Table 18 – Required impulse tests for damage	35
Table 19 – Summary of ESD coupling points	37
Table 20 – Specifications for ESD measurements	39
Table A.1 – Parameter ESD test circuit board	41

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INTEGRATED CIRCUITS –
EMC EVALUATION OF CAN TRANSCEIVERS**

FOREWORD

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- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 62228, which is a technical specification, has been prepared by subcommittee 47A: Integrated circuits, of IEC technical committee 47: Semiconductor devices.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
47A/747/DTS	47A/761/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an international standard;
- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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INTEGRATED CIRCUITS – EMC EVALUATION OF CAN TRANSCEIVERS

1 Scope

This document specifies test and measurement methods, test conditions, test setups, test procedures, failure criteria and test signals for the EMC evaluation of CAN transceivers concerning:

- the immunity against RF common mode disturbances on the signal lines,
- the emissions caused by non-symmetrical signals regarding the time and frequency domain,
- the immunity against transients (function and damage), and
- the immunity against electrostatic discharges – ESD (damage).

All measurements and functional tests except ESD are performed in a small (three transceiver) network. For ESD damage tests a single transceiver configuration on a special test board is used.

External protection circuits are not applied during the tests in order to get results for the transceiver IC only.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61967 (all parts), *Integrated circuits – Measurement of electromagnetic emissions, 150 kHz to 1 GHz*

IEC 61967-4, *Integrated circuits – Measurement of electromagnetic emissions, 150 kHz to 1 GHz – Part 4: Measurement of conducted emissions – 1 Ω /150 Ω direct coupling method*

IEC 62132 (all parts), *Integrated circuits – Measurement of electromagnetic immunity, 150 kHz to 1 GHz*

IEC 62132-1, *Integrated circuits – Measurement of electromagnetic immunity, 150 kHz to 1 GHz – Part 1: General conditions and definitions*

IEC 62132-4, *Integrated circuits – Measurement of electromagnetic immunity 150 kHz to 1 GHz – Part 4: Direct RF Power Injection Method*

IEC 61000-4-2:1995, *Electromagnetic compatibility – Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test¹⁾*
Amendment 1 (1998)
Amendment 2 (2000)

ISO 7637-2: 2004, *Road vehicles – Electrical disturbances from conduction and coupling – Part 2: Electrical transient conduction along supply lines only*

¹⁾ A consolidated edition 1.2 exists, including IEC 61000-4-2:1995 and its Amendment 1 (1998) and Amendment 2 (2000)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61967 and IEC 62132 apply.

4 Measurements and tests

4.1 General

For evaluation of the EMC characteristic of CAN transceivers different test conditions and test set-ups are used:

- configuration of three powered transceivers in a CAN network for:
 - evaluation of narrowband emission at the bus lines and
 - evaluation of RF and transient immunity at the bus lines, voltage supply line V_{Bat} and the wake-up line;
- configuration of single unpowered transceiver for testing the damage immunity against ESD of the pins for bus lines, V_{Bat} and wake-up on a test board with functional required external components.

An overview of the requested measurements and tests is given in Table 1.

Table 1 – Overview of requested measurements and tests

Transceiver state	Required test	Test method	Evaluation	Transceiver mode
Active (powered)	RF emission	150 Ω direct coupling (IEC 61967-4)	Spectrum and asymmetry	Normal
	RF immunity	DPI (IEC 62132-4)	Function	Normal
				Stand by
				Sleep
	Transient immunity	Supply lines- direct galvanic coupling I/O lines- capacitive coupling	Function	Normal
Stand by				
				Sleep
		Test pulse wave forms (ISO 7637-2)	Damage	Normal
Passive (unpowered)	ESD	Contact discharge (IEC 61000-4-2)	Damage	Normal

In order to reduce the effort for the characterization and to increase the compatibility of the results of different transceiver types, the number of test methods is defined to a necessary minimum. The 150 Ω direct coupling, DPI and direct galvanic and capacitive coupling methods are chosen for the evaluation of the EMC characteristic of active transceivers in a network configuration with three CAN nodes. While using a conductive decoupling and coupling, these three test methods are based on the same approach. Thus it is possible to use the same PCB for all required active/functional tests and measurements. These tests can be performed on the same test board in a common test configuration and set-up.

To get more reproducible test results, all measurement and tests should be done with soldered transceivers.

The described test conditions, configurations and test procedures are based on present stand-alone CAN transceivers. In case of ASICs with an integrated CAN transceiver, the test conditions cannot be defined completely for any type of IC. If it is possible, the test conditions