

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Integrated circuits – EMC evaluation of transceivers –  
Part 3: CAN transceivers**

**Circuits intégrés – Évaluation de la CEM des émetteurs-récepteurs –  
Partie 3: Émetteurs-récepteurs CAN**





## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2019 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

#### IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

### A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Recherche de publications IEC -

[webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

#### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [sales@iec.ch](mailto:sales@iec.ch).

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

#### Glossaire IEC - [std.iec.ch/glossary](http://std.iec.ch/glossary)

67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



---

**Integrated circuits – EMC evaluation of transceivers –  
Part 3: CAN transceivers**

**Circuits intégrés – Évaluation de la CEM des émetteurs-récepteurs –  
Partie 3: Émetteurs-récepteurs CAN**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

---

ICS 31.200

ISBN 978-2-8322-6639-7

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

|  |    |
|--|----|
| FOREWORD.....  | 6  |
| 1 Scope.....   | 8  |
| 2 Normative references .....   | 8  |
| 3 Terms, definitions and abbreviated terms .....   | 9  |
| 3.1 Terms and definitions.....   | 9  |
| 3.2 Abbreviated terms.....   | 10 |
| 4 General .....  | 10 |
| 5 Test and operating conditions.....   | 11 |
| 5.1 Supply and ambient conditions.....   | 11 |
| 5.2 Test operation modes .....   | 12 |
| 5.3 Test configuration .....   | 12 |
| 5.3.1 General test configuration for transceiver network .....                           | 12 |
| 5.3.2 General test configuration for unpowered ESD test.....                             | 13 |
| 5.3.3 Transceiver network tests – Coupling ports and networks.....                       | 14 |
| 5.3.4 ESD tests – Coupling ports and networks .....                                      | 15 |
| 5.4 Test signals .....   | 16 |
| 5.4.1 General .....  | 16 |
| 5.4.2 Test signals for normal operation mode .....                                       | 16 |
| 5.4.3 Test signal for wake-up from low power mode .....                                  | 18 |
| 5.5 Evaluation criteria .....  | 22 |
| 5.5.1 General .....  | 22 |
| 5.5.2 Evaluation criteria for functional operation modes.....                            | 22 |
| 5.5.3 Evaluation criteria in unpowered condition after exposure to<br>disturbances ..... | 28 |
| 5.5.4 Status classes .....   | 29 |
| 6 Test and measurement .....   | 29 |
| 6.1 Emission of RF disturbances.....   | 29 |
| 6.1.1 Test method .....  | 29 |
| 6.1.2 Test setup .....   | 29 |
| 6.1.3 Test procedure and parameters .....  | 30 |
| 6.2 Immunity to RF disturbances.....   | 31 |
| 6.2.1 Test method .....  | 31 |
| 6.2.2 Test setup .....   | 31 |
| 6.2.3 Test procedure and parameters .....  | 32 |
| 6.3 Immunity to impulses .....   | 37 |
| 6.3.1 Test method .....  | 37 |
| 6.3.2 Test setup .....   | 37 |
| 6.3.3 Test procedure and parameters .....  | 38 |
| 6.4 Electrostatic discharge (ESD) .....  | 41 |
| 6.4.1 Test method .....  | 41 |
| 6.4.2 Test setup .....   | 41 |
| 6.4.3 Test procedure and parameters .....  | 43 |
| 7 Test report.....   | 44 |
| Annex A (normative) CAN test circuits .....  | 45 |
| A.1 General.....   | 45 |
| A.2 Test circuit for CAN transceivers for functional tests .....                         | 45 |

|                       |   |    |
|-----------------------|---|----|
| A.3                   | Test circuit for CAN transceiver for ESD test.....  | 49 |
| Annex B (normative)   | Test circuit boards.....  | 51 |
| B.1                   | Test circuit board for functional tests .....   | 51 |
| B.2                   | ESD test .....  | 51 |
| Annex C (informative) | Examples for test limits for CAN transceiver in automotive application .....                                    | 53 |
| C.1                   | General.....  | 53 |
| C.2                   | Emission of RF disturbances.....  | 53 |
| C.3                   | Immunity to RF disturbances.....  | 54 |
| C.4                   | Immunity to impulses .....  | 57 |
| C.5                   | Electrostatic discharge (ESD) .....   | 57 |
| Annex D (informative) | Characterization of common mode choke for CAN bus interfaces.....   | 58 |
| D.1                   | General.....  | 58 |
| D.2                   | Abbreviations .....   | 58 |
| D.3                   | CMC test.....   | 58 |
| D.3.1                 | General .....   | 58 |
| D.3.2                 | Leakage inductance mismatch measurement.....  | 59 |
| D.3.3                 | S-parameter measurement mixed mode.....   | 63 |
| D.3.4                 | ESD damage .....  | 68 |
| D.3.5                 | Saturation test at RF disturbances.....   | 71 |
| Bibliography.....     |   | 74 |
| Figure 1 –            | General test configuration for tests in transceiver network .....   | 13 |
| Figure 2 –            | General test configuration for unpowered ESD test .....   | 13 |
| Figure 3 –            | Transceiver network tests – coupling ports and networks .....   | 14 |
| Figure 4 –            | Coupling ports and networks for ESD tests .....   | 16 |
| Figure 5 –            | Definition for trigger points and violation masks for CAN transceivers with flexible data rate capability ..... | 26 |
| Figure 6 –            | Principal drawing of the maximum deviation on an I-V characteristic .....                                       | 28 |
| Figure 7 –            | Test setup for measurement of RF disturbances .....   | 30 |
| Figure 8 –            | Test setup for DPI tests.....   | 32 |
| Figure 9 –            | Test setup for impulse immunity tests .....   | 37 |
| Figure 10 –           | Test setup for direct ESD tests – principal arrangement .....   | 42 |
| Figure 11 –           | Test setup for direct ESD tests – stimulation and monitoring .....  | 43 |
| Figure A.1 –          | General drawing of the circuit diagram of test network for CAN standard transceivers for functional test .....  | 47 |
| Figure A.2 –          | General drawing of the circuit diagram of test network for CAN PN transceivers for functional test .....        | 49 |
| Figure A.3 –          | General drawing of the circuit diagram for direct ESD tests of CAN transceivers in unpowered mode.....          | 50 |
| Figure B.1 –          | Example of IC interconnections of CAN signal .....  | 51 |
| Figure B.2 –          | Example of ESD test board for CAN transceivers.....   | 52 |
| Figure C.1 –          | Example of limits for RF emission – CAN with bus filter .....   | 53 |
| Figure C.2 –          | Example of limits for RF emission – other global pins .....   | 54 |
| Figure C.3 –          | Example of limits for RF emission – local supplies .....  | 54 |

|   |    |
|---|----|
| Figure C.4 – Example of limits for RF immunity for functional status class A <sub>IC</sub> – CAN with bus filter .....                    | 55 |
| Figure C.5 – Example of limits for RF immunity for functional status class A <sub>IC</sub> – CAN .....                                    | 55 |
| Figure C.6 – Example of limits for RF immunity for functional status class A <sub>IC</sub> – other global pins .....                      | 56 |
| Figure C.7 – Example of limits for RF immunity for functional status class C <sub>IC</sub> or D <sub>IC</sub> – CAN with bus filter ..... | 56 |
| Figure C.8 – Example of limits for RF immunity for functional status class C <sub>IC</sub> or D <sub>IC</sub> – other global pins .....   | 57 |
| Figure D.1 – General electrical drawing of a CMC .....  | 59 |
| Figure D.2 – Test setup for 2-port S-Parameter measurements for leakage inductance evaluation .....                                       | 59 |
| Figure D.3 – Example of a two-port test board for CMC leakage inductance characterization .....   | 60 |
| Figure D.4 – Example of CMC characterization measurement results .....  | 63 |
| Figure D.5 – Test setup for S-Parameter measurements .....  | 64 |
| Figure D.6 – Example test board S-Parameter measurement – mixed mode, top layer .....   | 65 |
| Figure D.7 – Example test board S-Parameter measurement – single ended, top layer .....   | 65 |
| Figure D.8 – Recommended characteristics for S <sub>dd21</sub> (IL) .....   | 67 |
| Figure D.9 – Recommended characteristic for S <sub>cc21</sub> (CMR) .....   | 68 |
| Figure D.10 – Recommended characteristic for S <sub>sd21</sub> and S <sub>sd12</sub> (DCMR) .....   | 68 |
| Figure D.11 – Test setup for ESD damage tests .....   | 69 |
| Figure D.12 – Example test board ESD, top layer .....   | 70 |
| Figure D.13 – Test setup for RF saturation measurements .....   | 71 |
| Figure D.14 – Example RF saturation / S-Parameter test board, top layer .....   | 72 |
| <br>  |    |
| Table 1 – Overview of measurements and tests .....  | 11 |
| Table 2 – Supply and ambient conditions for functional operation .....  | 12 |
| Table 3 – Transceiver network tests – component value definitions of coupling ports and networks .....                                    | 15 |
| Table 4 – Definitions of coupling ports for ESD tests .....   | 16 |
| Table 5 – Communication test signal TX1 .....   | 17 |
| Table 6 – Communication test signal TX2a .....  | 17 |
| Table 7 – Communication test signal TX2b .....  | 18 |
| Table 8 – Wake-up test signal TX3 .....   | 18 |
| Table 9 – Communication test signal TX4a .....  | 19 |
| Table 10 – Communication test signal TX4b .....   | 19 |
| Table 11 – Communication test signal TX4c .....   | 19 |
| Table 12 – Communication test signal TX4d .....   | 20 |
| Table 13 – Communication test signal TX4e .....   | 20 |
| Table 14 – Communication test signal TX4f1 .....  | 20 |
| Table 15 – Communication test signal TX4f2 .....  | 21 |
| Table 16 – Communication test signal TX4g .....   | 21 |
| Table 17 – Communication test signal TX4h .....   | 21 |
| Table 18 – Communication test signal TX4i .....   | 22 |

|   |    |
|---|----|
| Table 19 – Evaluation criteria for CAN transceiver standard functions .....   | 23 |
| Table 20 – Evaluation criteria for CAN transceivers with partial networking functionality .....   | 23 |
| Table 21 – Specific definition for test procedure for evaluation of CAN transceiver partial networking function .....                         | 24 |
| Table 22 – Evaluation criteria for CAN transceivers with flexible data rate capability.....   | 25 |
| Table 23 – Definitions for violation masks for CAN transceivers with flexible data rate capability .....                                      | 27 |
| Table 24 – Definition of functional status classes .....  | 29 |
| Table 25 – Settings of the RF measurement equipment .....   | 31 |
| Table 26 – RF emission measurements .....   | 31 |
| Table 27 – Specifications for DPI tests .....   | 33 |
| Table 28 – DPI tests for functional status class A <sub>1C</sub> evaluation of CAN transceiver standard function .....                        | 34 |
| Table 29 – DPI tests for functional status class A <sub>1C</sub> evaluation of CAN transceiver partial networking function .....              | 35 |
| Table 30 – DPI tests for functional status class A <sub>1C</sub> evaluation of CAN transceiver CAN FD function .....                          | 36 |
| Table 31 – DPI tests for functional status class C <sub>1C</sub> or D <sub>1C</sub> evaluation of CAN transceivers .....                      | 36 |
| Table 32 – Specifications for impulse immunity tests .....  | 38 |
| Table 33 – Parameters for impulse immunity test .....   | 38 |
| Table 34 – Impulse immunity tests for functional status class A <sub>1C</sub> evaluation of CAN transceiver standard function .....           | 39 |
| Table 35 – Impulse immunity tests for functional status class A <sub>1C</sub> evaluation of CAN transceiver partial networking function ..... | 40 |
| Table 36 – Impulse immunity tests for functional status class A <sub>1C</sub> evaluation of CAN transceiver CAN FD function .....             | 40 |
| Table 37 – Impulse immunity tests for functional status class C <sub>1C</sub> or D <sub>1C</sub> evaluation of CAN transceivers .....         | 41 |
| Table 38 – Specifications for direct ESD tests.....   | 43 |
| Table 39 – ESD tests in unpowered mode for functional status class D <sub>1C</sub> evaluation of CAN transceivers .....                       | 44 |
| Table B.1 – Parameters of ESD test circuit board .....  | 52 |
| Table C.1 – Example of limits for impulse immunity for functional status class C <sub>1C</sub> or D <sub>1C</sub> ..                          | 57 |
| Table D.1 – Test procedure and parameters for leakage inductance evaluation .....   | 61 |
| Table D.2 – Leakage inductance measurements .....   | 62 |
| Table D.3 – Leakage inductance mismatch classes .....   | 63 |
| Table D.4 – Test procedure and parameters for 3-port test board characterization.....   | 64 |
| Table D.5 – Test procedure and parameters for S-Parameter measurements.....   | 66 |
| Table D.6 – Required S-Parameter measurements .....   | 67 |
| Table D.7 – Test parameters for ESD damage tests.....   | 70 |
| Table D.8 – Required ESD tests for damage .....   | 71 |
| Table D.9 – Test procedure and parameters for RF saturation tests.....  | 72 |
| Table D.10 – Required RF saturation tests.....  | 73 |

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INTEGRATED CIRCUITS –  
EMC EVALUATION OF TRANSCEIVERS –****Part 3: CAN transceivers**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62228-3 has been prepared by subcommittee 47A: Integrated circuits, of IEC technical committee 47: Semiconductor devices.

This first edition cancels and replaces the first edition of IEC TS 62228 published in 2007 and constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC TS 62228:

- a) introduction of CAN transceivers with partial networking functionality and CAN transceivers with flexible data rate capability and addition of operation modes and test descriptions in the respective subclauses of the document;
- b) introduction of minimal communication network with two CAN transceivers;
- c) update of the test requirements and targets in Annex C;
- d) addition of Annex D for common mode choke characterization.

The text of this standard is based on the following documents:

| CDV          | Report on voting |
|--------------|------------------|
| 47A/1050/CDV | 47A/1069/RVC     |

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62228 series, published under the general *title Integrated circuits – EMC evaluation of transceivers*, can be found on the IEC website.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

# INTEGRATED CIRCUITS – EMC EVALUATION OF TRANSCEIVERS –

## Part 3: CAN transceivers

### 1 Scope

This part of IEC 62228 specifies test and measurement methods for EMC evaluation of CAN transceiver ICs under network condition. It defines test configurations, test conditions, test signals, failure criteria, test procedures, test setups and test boards. It is applicable for CAN standard transceivers, CAN transceivers with partial networking functionality and CAN transceivers with flexible data rate capability and covers

- the emission of RF disturbances,
- the immunity against RF disturbances,
- the immunity against impulses, and
- the immunity against electrostatic discharges (ESD).

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61967-1, *Integrated circuits – Measurement of electromagnetic emissions – Part 1: General conditions and definitions*

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

IEC 62132-1, *Integrated circuits – Measurement of electromagnetic immunity – 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 62215-3, *Integrated circuits – Measurement of impulse immunity – Part 3: Non-synchronous transient injection method*

IEC 62228-1, *Integrated circuits – EMC evaluation of transceivers – Part 1: General conditions and definitions*

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

ISO 10605, *Road vehicles – Test methods for electrical disturbances from electrostatic discharge*

ISO 11898-1, *Road vehicles – Controller area network (CAN) – Part 1: Data link layer and physical signalling*

ISO 11898-2, *Road vehicles – Controller area network (CAN) – Part 2: High speed medium access unit*

### 3 Terms, definitions and abbreviated terms

#### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62228-1, IEC 61967-1, IEC 62132-1, as well as the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

##### 3.1.1

###### **global pin**

pin that carries a signal or power, which enters or leaves the application board without any active component in between

##### 3.1.2

###### **CAN standard transceiver**

transceiver with functionality according to ISO 11898-2 with data rates up to 1 MBit/s and access to RxD and TxD signal

##### 3.1.3

###### **CAN PN transceiver**

transceiver with partial networking functionality according to ISO 11898-2 with access to RxD and TxD signal

##### 3.1.4

###### **CAN FD transceiver**

transceiver with flexible data rate capability according to ISO 11898-2 with data rates up to 2 MBit/s or 5 Mbit/s and access to RxD and TxD signal

##### 3.1.5

###### **Low Power – standby**

transceiver functional operation mode low power with active bus biasing

##### 3.1.6

###### **Low Power – sleep**

transceiver functional operation mode low power with inactive bus biasing

##### 3.1.7

###### **Low Power – PN standby**

transceiver functional operation mode low power with active bus biasing and frame detection active

##### 3.1.8

###### **Low Power – PN sleep**

transceiver functional operation mode low power with inactive bus biasing and frame detection configured

##### 3.1.9

###### **mandatory components, pl**

components needed for proper function of IC as specified by the IC manufacturer

### 3.2 Abbreviated terms

|      |   |
|------|---|
| ASIC | application specific integrated circuit |
| CMC  | common mode choke                       |
| DUT  | device under test                       |
| DPI  | direct RF power injection               |
| ERR  | error                                   |
| FD   | flexible data rate                      |
| INH  | inhibit                                 |
| CAN  | controller area network                 |
| PCB  | printed circuit board                   |
| PN   | partial networking                      |
| RxD  | receive data                            |
| SBC  | system base chip                        |
| TxD  | transmit data                           |
| WUF  | wake-up frame                           |

## 4 General

The intention of this document is to evaluate the EMC performance of CAN transceivers under application conditions in a minimal network.

The evaluation of the EMC characteristics of CAN transceivers shall be performed in functional operation modes under network condition for RF emission, RF immunity and impulse immunity tests and on a single transceiver for electrostatic discharge tests.

The aim of these tests is to determine the EMC performance on dedicated pins of the CAN transceiver which are considered as EMC relevant in the application. For a CAN transceiver IC, these pins are CAN\_H, CAN\_L,  $V_{BAT}$  and WAKE. Depending on the IC and its functionality, other pins as for example  $V_{CC}$  should be considered as well.

The test methods used for the EMC characterization are based on the international standards for IC EMC tests and are described in Table 1.