

SLOVENSKI STANDARD

SIST EN IEC 62228-7:2026

01-november-2026

Nadomešča:

SIST EN IEC 62228-7:2022

Integrirana vezja - Vrednotenje elektromagnetne združljivosti (EMC) oddajnikov-sprejemnikov - 7. del: Oddajniki-sprejemniki CXPI (IEC 62228-7:2026)

Integrated circuits - EMC evaluation of transceivers - Part 7: CXPI transceivers (IEC 62228-7:2026)

Integrierte Schaltungen - Bewertung der elektromagnetischen Verträglichkeit von Sende-Empfangsgeräten – Teil 7: CXPI-Sende-Empfangsgeräte (IEC 62228-7:2026)

Circuits intégrés - évaluation de la CEM des émetteurs-récepteurs - Partie 7: émetteurs-récepteurs CXPI (IEC 62228-7:2026)

Ta slovenski standard je istoveten z: EN IEC 62228-7:2026

ICS:

31.200	Integrirana vezja, mikroelektronika	Integrated circuits. Microelectronics
33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general

SIST EN IEC 62228-7:2026

en

Sample Document

get full document from standards.iteh.ai

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN IEC 62228-7

September 2026

ICS 31.200

Supersedes EN IEC 62228-7:2022

English Version

**Integrated circuits - EMC evaluation of transceivers - Part 7:
CXPI transceivers
(IEC 62228-7:2026)**

Circuits intégrés - Évaluation de la CEM des émetteurs-
récepteurs - Partie 7: Émetteurs-récepteurs CXPI
(IEC 62228-7:2026)

Integrierte Schaltungen - Bewertung der
elektromagnetischen Verträglichkeit von Sende-
Empfangsgeräten - Teil 7: CXPI-Sende-Empfangsgeräte
(IEC 62228-7:2026)

This European Standard was approved by CENELEC on 2026-08-17. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2026 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

Ref. No. EN IEC 62228-7:2026 E

EN IEC 62228-7:2026 (E)**European foreword**

The text of document 47A/1180/CDV, future edition 2 of IEC 62228-7, prepared by SC 47A "Integrated circuits" of IEC/TC 47 "Semiconductor devices" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62228-7:2026.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2027-09-30 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2029-09-30 document have to be withdrawn

This document supersedes EN IEC 62228-7:2022 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 62228-7:2026 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

CISPR 16-1-1	NOTE	Approved as EN IEC 55016-1-1
IEC 61000-4-4	NOTE	Approved as EN 61000-4-4
IEC 61000-4-5	NOTE	Approved as EN 61000-4-5

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61967-1	-	Integrated circuits - Measurement of electromagnetic emissions - Part 1: General conditions and definitions	EN IEC 61967-1	-
IEC 61967-4	-	Integrated circuits - Measurement of electromagnetic emissions - Part 4: Measurement of conducted emissions - 1 ohm/150 ohm direct coupling method	EN IEC 61967-4	-
IEC 62132-1	-	Integrated circuits - Measurement of electromagnetic immunity - Part 1: General conditions and definitions	EN 62132-1	-
IEC 62132-4	-	Integrated circuits - Measurement of electromagnetic immunity 150 kHz to 1 GHz - Part 4: Direct RF power injection method	EN 62132-4	-
IEC 62215-3	-	Integrated circuits - Measurement of impulse immunity - Part 3: Non-synchronous transient injection method	EN 62215-3	-
IEC 62228-1	-	Integrated circuits - EMC evaluation of transceivers - Part 1: General conditions and definitions	EN IEC 62228-1	-
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 20794-4	-	Road vehicles - Clock extension peripheral interface (CXPI) - Part 4: Data link layer and physical layer	-	-
ISO 20794-7	-	Road vehicles - Clock extension peripheral interface (CXPI) - Part 7: Data link and physical layer conformance test plan	-	-
EIA-198-1	-	Ceramic Dielectric Capacitors Classes I, II, III, and IV - Part 1: Characteristics and Requirements	-	-

Sample Document

get full document from standards.iteh.ai



IEC 62228-7

Edition 2.0 2026-07

INTERNATIONAL STANDARD

**Integrated circuits - EMC evaluation of transceivers -
Part 7: CXPI transceivers**

Sample Document

get full document from standards.iteh.ai

CONTENTS

FOREWORD	5
1 Scope	7
2 Normative references	7
3 Terms, definitions and abbreviated terms	8
3.1 Terms and definitions	8
3.2 Abbreviated terms	8
4 General	9
5 Test and operating conditions	11
5.1 Supply and ambient conditions	11
5.2 Test operation modes	11
5.3 Test configuration	12
5.3.1 General test configuration for functional test	12
5.3.2 General test configuration for unpowered ESD test	13
5.3.3 Coupling ports and coupling networks for functional tests	13
5.3.4 Coupling ports and coupling networks for unpowered ESD tests	14
5.3.5 Power supply with decoupling network	15
5.4 Test signals	15
5.4.1 General	15
5.4.2 Test signals for normal operation mode	15
5.4.3 Test signal for wake-up from sleep mode	17
5.5 Evaluation criteria	18
5.5.1 General	18
5.5.2 Evaluation criteria in functional operation modes during exposure to disturbances	18
5.5.3 Evaluation criteria in unpowered condition after exposure to disturbances	20
5.5.4 Status classes	21
6 Test and measurement	21
6.1 Emission of RF disturbances	21
6.1.1 Test method	21
6.1.2 Test setup	21
6.1.3 Test procedure and parameters	22
6.2 Immunity to RF disturbances	22
6.2.1 Test method	22
6.2.2 Test setup	23
6.2.3 Test procedure and parameters	24
6.3 Immunity to impulses	26
6.3.1 Test method	26
6.3.2 Test setup	26
6.3.3 Test procedure and parameters	27
6.4 Electrostatic discharge (ESD)	30
6.4.1 Test method	30
6.4.2 Test setup	30
6.4.3 Test procedure and parameters	32
7 Test report	32
Annex A (normative) CXPI test circuits	33

IEC 62228-7:2026 © IEC 2026

A.1	General.....	33
A.2	CXPI test circuit for functional tests on standard type-A CXPI transceiver ICs.....	33
A.3	CXPI test circuit for functional tests on standard type-B CXPI transceiver ICs.....	36
A.4	CXPI test circuit for functional tests on ICs with embedded CXPI transceiver.....	38
A.5	CXPI test circuit for unpowered ESD test on a standard type-A CXPI transceiver IC	41
A.6	CXPI test circuit for unpowered ESD test on a standard type-B CXPI transceiver IC	41
Annex B	(normative) Test circuit boards.....	43
B.1	Test circuit board for functional tests	43
B.2	ESD test	44
Annex C	(informative) Examples for test limits for CXPI transceiver in automotive application	45
C.1	General.....	45
C.2	Emission of RF disturbances.....	45
C.3	Immunity to RF disturbances.....	46
C.4	Immunity to impulse	47
C.5	Electrostatic discharge (ESD)	48
Annex D	(informative) Example of setting for test signals.....	49
Annex E	(informative) Points to note for impulse immunity measurement for functional status class A _{IC}	51
E.1	General.....	51
E.2	Points to note when testing pulse 1.....	51
Bibliography		53
Figure 1	– PHY sub-layers overview and CXPI transceiver types	10
Figure 2	– General test configuration for tests in functional operation modes	12
Figure 3	– General test configuration for unpowered ESD test	13
Figure 4	– Coupling ports and networks for functional tests	13
Figure 5	– Coupling ports and networks for unpowered ESD tests	14
Figure 6	– Test signal types for standard type-A CXPI transceiver ICs.....	16
Figure 7	– Test signal types for standard type-B CXPI transceiver ICs.....	17
Figure 8	– Wake-up signal types for standard CXPI transceiver ICs.....	18
Figure 9	– Principle drawing of the maximum deviation in an I-V characteristic	20
Figure 10	– Test setup for measurement of RF disturbances.....	21
Figure 11	– Test setup for DPI tests.....	23
Figure 12	– Test setup for impulse immunity tests.....	27
Figure 13	– Test setup for direct ESD tests.....	31
Figure A.1	– General drawing of the circuit diagram of the test network for standard type-A CXPI transceiver ICs for functional tests	35
Figure A.2	– General drawing of the circuit diagram of the test network for standard type-B CXPI transceiver ICs for functional tests	37
Figure A.3	– General drawing of the circuit diagram of the test network for ICs with embedded CXPI transceiver for functional tests using standard type-A CXPI transceiver IC as Node 1	39

IEC 62228-7:2026 © IEC 2026

Figure A.4 – General drawing of the circuit diagram of the test network for ICs with embedded CXPI transceiver for functional tests using IC with embedded CXPI transceiver as Node 1	40
Figure A.5 – A general drawing of the test circuit diagram for testing direct ESD of CXPI transceiver in unpowered mode	41
Figure A.6 – A general drawing of the test circuit diagram for testing direct ESD of CXPI standard Type-B transceiver in unpowered mode	42
Figure B.1 – Example of IC interconnections of CXPI signal	43
Figure B.2 – Example of ESD test board for CXPI transceiver ICs	44
Figure C.1 – Example of limits for RF emission – CXPI	45
Figure C.2 – Example of limits for RF emission – VBAT	45
Figure C.3 – Example of limits for RF immunity for functional status class A _{IC} – CXPI	46
Figure C.4 – Example of limits for RF immunity for functional status class A _{IC} – VBAT	46
Figure C.5 – Example of limits for RF immunity for functional status class C _{IC} or D _{IC} – CXPI	47
Figure C.6 – Example of limits for RF immunity for functional status class C _{IC} or D _{IC} – VBAT	47
Figure D.1 – Example of signal setting for standard type-A in two transceiver configuration	49
Figure D.2 – Example of signal setting for standard type-B in two transceiver configuration	50
Figure E.1 – Relationship between ISO 7637-2 pulse 1 and transceiver VBAT supply	51
Figure E.2 – Transceiver VBAT supply image when t_2 time is shortened	52
Table 1 – Types for CXPI transceiver	9
Table 2 – Overview of required measurement and tests	10
Table 3 – Supply and ambient conditions for functional operation	11
Table 4 – Definition of coupling ports and coupling network components for functional tests	14
Table 5 – Definitions of coupling ports for unpowered ESD tests	15
Table 6 – Communication test signal TX1	15
Table 7 – Communication test signal TX2	16
Table 8 – Communication test signal TX3	17
Table 9 – Wake-up test signal TX4	18
Table 10 – Evaluation criteria for standard type-A in functional operation modes	19
Table 11 – Evaluation criteria for standard type-B in functional operation modes	19
Table 12 – Evaluation criteria for ICs with embedded CXPI transceiver in functional operation modes	20
Table 13 – Parameters for emission measurements	22
Table 14 – Settings for the RF measurement equipment	22
Table 15 – Specifications for DPI tests	24
Table 16 – Required DPI tests for functional status class A _{IC} evaluation of standard type-A	25
Table 17 – Required DPI tests for functional status class A _{IC} evaluation of standard type-B	25

IEC 62228-7:2026 © IEC 2026

Table 18 – Required DPI tests for functional status class A _{IC} evaluation of ICs with embedded CXPI transceiver.....	25
Table 19 – Required DPI tests for functional status class C _{IC} , D1 _{IC} or D2 _{IC} evaluation of standard CXPI transceiver ICs and ICs with embedded CXPI transceiver.....	26
Table 20 – Specifications for impulse immunity tests	28
Table 21 – Parameters for impulse immunity tests	28
Table 22 – Required impulse immunity tests for functional status class A _{IC} evaluation of standard type-A	29
Table 23 – Required impulse immunity tests for functional status class A _{IC} evaluation of standard type-B	29
Table 24 – Required impulse immunity tests for functional status class A _{IC} evaluation of ICs with embedded CXPI transceiver	29
Table 25 – Required impulse immunity tests for functional status class C _{IC} , D1 _{IC} or D2 _{IC} evaluation of standard CXPI transceiver ICs and ICs with embedded CXPI transceiver	30
Table 26 – Specifications for direct ESD tests.....	32
Table B.1 – Parameter ESD test circuit board	44
Table C.1 – Example of limits for impulse immunity for functional status class C _{IC} or D _{IC}	47

Sample Document

get full document from standards.iteh.ai

INTERNATIONAL ELECTROTECHNICAL COMMISSION

Integrated circuits - EMC evaluation of transceivers - Part 7: CXPI 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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 62228-7 has been prepared by subcommittee 47A: Integrated circuits, of IEC technical committee 47: Semiconductor devices. It is an International Standard.

This second edition cancels and replaces the first edition published in 2022. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) change transceiver terms and definitions from master to commander and slave to responder in 3.1.5 and 3.1.6.
- b) change test configuration for embedded transceiver in 5.3.1 and add on Figure A.4 accordingly.
- c) change the definition of TX2 test signal for type-B transceiver in 5.4.2.
- d) add examples for test limits in Annex C.

IEC 62228-7:2026 © IEC 2026

The text of this International Standard is based on the following documents:

Draft	Report on voting
47A/1180/CDV	47A/1195/RVC

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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 document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

Sample Document

get full document from standards.iteh.ai

1 Scope

This part of IEC 62228 specifies test and measurement methods for the EMC evaluation of CXPI transceiver ICs under network condition. It defines test configurations, test conditions, test signals, failure criteria, test procedures, test setups and test boards. This specification is applicable for standard CXPI transceiver ICs and ICs with embedded CXPI transceiver and covers

- the emission of RF disturbances;
- the immunity against RF disturbances;
- the immunity against impulses;
- 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 - Part 4: Measurement of conducted emissions - 1 Ω /150 Ω 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 20794-4, *Road vehicles - Clock extension peripheral interface (CXPI) - Part 4: Data link layer and physical layer*

ISO 20794-7, *Road vehicles - Clock extension peripheral interface (CXPI) - Part 7: Data link and physical layer conformance test plan*

EIA-198-1, *Ceramic Dielectric Capacitors Classes I, II, III, and IV - Part 1: Characteristics and Requirements*

3 Terms, definitions and abbreviated terms

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

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

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

3.1 Terms and definitions

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

standard CXPI transceiver IC

standalone CXPI transceiver according to ISO 20794-4 or IC with integrated CXPI transceiver cell with access to CXPI RXD and TXD signal

3.1.3

IC with embedded CXPI transceiver

IC with integrated CXPI transceiver cell and CXPI protocol handler, with or without access to CXPI RXD and TXD signal

3.1.4

mandatory components

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

3.1.5

commander node

node that provides schedule management (including ReqTypeId transmission), the primary clock and optionally the sleep message transmission management

3.1.6

responder node

node other than commander node connected to the CXPI network

3.1.7

ReqTypeId

request type identifier, parameter that enables the polling method for dedicated measurement data and/or control data

3.2 Abbreviated terms

ASSP	application specific standard product
CRC	cyclic redundancy check
CXPI	clock extension peripheral interface
DLL	data link layer
EN	enable
FI	frame information
IBS	inter byte space
NRZ	non-return to zero