

# INTERNATIONAL STANDARD



**Maritime navigation and radiocommunication equipment and systems – Class B  
shipborne equipment of the automatic identification system (AIS) –  
Part 2: Self-organising time division multiple access (SOTDMA) techniques**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MARITIME NAVIGATION AND RADIOCOMMUNICATION  
EQUIPMENT AND SYSTEMS –  
CLASS B SHIPBORNE EQUIPMENT OF  
THE AUTOMATIC IDENTIFICATION SYSTEM (AIS) –**

**Part 2: Self-organising time division multiple access  
(SOTDMA) techniques**

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

FDIS	Report on voting
80/685/FDIS	80/691/RVD

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 62287 series, published under the general title *Maritime navigation and radiocommunication and systems – Class B shipborne equipment of the automatic identification system (AIS)*, 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 web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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# MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – CLASS B SHIPBORNE EQUIPMENT OF THE AUTOMATIC IDENTIFICATION SYSTEM (AIS) –

## Part 2: Self-organising time division multiple access (SOTDMA) techniques

### 1 Scope

This part of IEC 62287 specifies operational and performance requirements, methods of testing and required test results for Class B “SO” shipborne AIS equipment using Self-organised TDMA (SOTDMA) techniques as described in Recommendation ITU-R M.1371. This standard takes into account other associated IEC International Standards and existing national standards, as applicable.

The main differences between Class B “CS” (IEC 62287-1) and Class B “SO” units are that the Class B “SO”:

- covers all 25 kHz channels listed in Recommendation ITU-R M.1084-5;
- only uses the internal GNSS, no position sensor input is allowed;
- requires use of VDL Message 17 for correction of the internal GNSS;
- has a presentation interface;
- has additional reporting intervals, down to 5 s;
- has two power settings, with a high level of 5 W;
- has the capability to transmit binary messages.

It is applicable for AIS equipment used on craft that are not covered by a mandatory carriage requirement of AIS under SOLAS Chapter V.

### 2 Normative references

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

IEC 60945:2002, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61108 (all parts), *Maritime navigation and radio communication equipment and systems – Global navigation satellite systems (GNSS)*

IEC 61108-4, *Maritime navigation and radio communication equipment and systems – Global navigation satellite systems (GNSS) – Part 4: Shipborne DGPS and DGLONASS maritime radio beacon receiver equipment – Performance requirements, methods of testing and required test results*

IEC 61162 (all parts), *Maritime navigation and radiocommunication equipment and systems – Digital interfaces*

IEC 61162-1, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*

IEC 61993-2, *Maritime navigation and radio communication equipment and systems – Automatic identification systems (AIS) – Part 2: Class A shipborne equipment of the universal automatic identification system (AIS) – Operational and performance requirements, methods of test and required test results*

ITU Radio regulations 2012, *Appendices*

ITU-R Recommendation M.825-3:1998, *Characteristics of a transponder system using digital selective calling techniques for use with vessel traffic services and ship-to-ship identification*

ITU-R Recommendation M.1084-5, *Interim solutions for improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service*

ITU-R Recommendation M.1371-4:2010, *Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile band*

### 3 Abbreviations

AIS	Automatic Identification System
BER	Bit Error Rate
BIIT	Built-In Integrity Tests
BT	Bandwidth Time
COG	Course over ground
CRC	Cyclic Redundancy Check
CSD	Compass Safe Distance
DGNSS	Differential Global Navigation Satellite Service
DLS	Data Link Service
DSC	Digital Selective Calling
EUT	Equipment under test
FM	Frequency Modulation
GMSK	Gaussian Minimum Shift Keying
GNSS	Global Navigation Satellite Service
IMO	International Maritime Organization
ITDMA	Incremental Time Division Multiple Access
ITU	International Telecommunication Union
LME	Link Management Entity
MAC	Medium access control
MMSI	Maritime Mobile Service Identity
MSSA	Multi-channel slot selection access
NM	Nautical mile (1 NM = 1 852 m)
NRZI	Non Return to Zero Inverted
OSI	Open Systems Interconnection model
PER	Packet Error Rate
PI	Presentation Interface
RAIM	Receiver autonomous integrity monitoring

RATDMA	Random Access Time Division Multiple Access
RF	Radio Frequency
RR	Radio Regulations
Rx	Receive
SAR	Search and rescue
SINAD	Signal Interference Noise and Distortion ratio
SOG	Speed over ground
SOTDMA	Self Organised Time Division Multiple Access
TDMA	Time Division Multiple Access
Tx	Transmit
UTC	Universal Time Co-ordinated
VDL	VHF Data Link
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio
VTS	Vessel Traffic Services

NOTE Abbreviations included in the IEC 61162 series are not specified in the above list. Refer to this series of International Standards for these abbreviations.

## 4 General requirements

### 4.1 General

#### 4.1.1 Capabilities of the Class B “SO” AIS

The Class B “SO” AIS shall improve the safety of navigation by assisting in the efficient navigation of ships and small craft, protection of the environment, and operation of Vessel Traffic Services (VTS).

The Class B “SO” AIS station shall be inter-operable and compatible with all AIS stations operating on the AIS VHF Data Link. In particular, Class B “SO” AIS stations shall not degrade the integrity of the AIS VHF Data Link.

The Class B “SO” AIS shall be capable of providing information from the craft, automatically, continuously and with the required accuracy and update rate

- in a ship-to-ship mode for collision avoidance,
- as a means for littoral States to obtain information about the craft, and
- as a VTS tool, i.e. ship-to-shore (traffic management).

#### 4.1.2 Quality assurance

(See 10.1.1)

Manufacturers shall have a quality control system audited by a competent authority to ensure continuous compliance with the requirements of this standard. Alternatively, the manufacturer may use final product verification procedures where a competent authority verifies compliance with the requirements of this standard before the product is put to the market.

NOTE The ISO 9000 series, as applicable, meets the requirements of a quality control system.

#### 4.1.3 Safety of operation

(See 10.1.2)

It shall not be possible for the operator to augment, amend or erase any program software required for operation in accordance with this equipment standard. The manufacturer may provide means to install software updates.

Data used during operation and stored in the system shall be protected in such a way that necessary modifications and amendments by the user cannot endanger its integrity and correctness.

#### 4.1.4 Additional features

(See 10.1.3, 13.6)

Where equipment provides a feature that is additional to the minimum requirements and options of this standard, the operation and, as far as is reasonably practicable, the malfunction of such additional features shall not degrade the performance of the equipment.

#### 4.1.5 Functionality

The equipment shall operate in three modes (see 7.3.4.3):

- autonomous (default mode);
- assigned;
- interrogation.

#### 4.2 Manuals

(See 10.1.1)

The manuals shall include the

- type of external connectors, if applicable,
- information for correct installation and positioning of the antennas,
- information for compass safe distance.

#### 4.3 Marking and identification

(See 10.1.1)

In addition to the requirements of IEC 60945:2002, 4.9, the markings shall include:

- details of the power supply from which the equipment is intended to be operated;
- if applicable, the date by which batteries need to be replaced.

### 5 Environmental, power supply, interference and safety requirements

(See Clause 9)

In addition to the specific requirements of this standard, the Class B “SO” AIS shall fulfil the following general requirements as detailed in IEC 60945:

- inter-unit connection (electrical interfaces other than IEC 61162 are permissible);
- power supply;
- extreme power supply;
- excessive conditions;
- power supply short-term variation and power supply failure;
- durability and resistance to environmental conditions;
- interference;

- electromagnetic compatibility;
- compass safe distance;
- safety precautions;
- protection against accidental access to dangerous voltages;
- electromagnetic radiofrequency radiation.

The Class B “SO” AIS shall not enter an undefined or unstable state in case of under voltage.

The manufacturer shall declare the category of the equipment as follows:

- a) portable;
- b) protected from the weather;
- c) exposed to the weather;
- d) submerged or in continuous contact with sea water.

The Class B “SO” AIS shall be tested for compliance with the environmental, power supply, special-purpose and safety requirements of IEC 60945.

- AIS equipment declared for protected installation shall meet the requirements described in Table 3 column "Protected" of IEC 60945:2002;
- exposed AIS equipment shall meet the requirements described in Table 3, column "Exposed" of IEC 60945;
- portable AIS equipment shall meet the requirements of Table 3 of IEC 60945:2002 "Protected" or "Exposed" as appropriate.

In addition, the AIS installation, when operating, shall not be damaged by the effects of open circuited or short circuited antenna terminals.

## 6 Performance requirements

### 6.1 Internal processes

(See 10.1.1)

The Class B “SO” AIS shall comprise:

- a communication processor, capable of operating in the VHF Maritime Mobile Service band;
- at least one transmitter and two receiving processes for TDMA operation;
- a third receiving process for DSC channel management;
- a means for automatic channel switching in the maritime mobile band (by Message 22 and by DSC). Manual channel switching shall not be provided;
- an internal GNSS position sensor, which provides a resolution of one ten thousandth of a minute of arc and uses the WGS-84 datum only.