IEC 62753

Edition 1.0 2015-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Digital terrestrial television receivers for the DTMB system

Récepteurs de télévision numérique terrestre pour système DTMB

IEC 62753:2015-06(en-fr)

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

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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DIGITAL TERRESTRIAL TELEVISION RECEIVERS FOR THE DTMB SYSTEM

FOREWORD

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International Standard IEC 62753 has been prepared by technical area 1: Terminals for audio, video and data services and contents of IEC technical committee 100: Audio, video and multimedia systems and equipment.

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

CDV	Report on voting
100/2108/CDV	100/2429A/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.

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- withdrawn,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.

INTRODUCTION

This International Standard contains baseline specifications and test methods of receivers for the DTMB system. The DTMB (Digital Terrestrial/Television Multimedia Broadcasting) is the digital television terrestrial broadcasting standard of China published in August 2006. The main technologies adopted in this standard are: frame header design and guard interval padding with pseudo-random noise sequences, which can be used for fast synchronization and high-efficiency channel estimation/equalization, low-density parity-check channel coding, spread spectrum transmission of system information. This standard can support payload data rate ranging from 4,813 Mbit/s to 32,486 Mbit/s, standard-definition TV and high-definition TV services, mobile and stationary receptions, multiple frequency network and single frequency network.

- Digital television, as a new generation of TV technology, can improve the transmission quality and make it possible to provide more services. With the worldwide transition from the analogue TV to digital TV, the developing prospect of the DTMB system can be expected in the future.

DIGITAL TERRESTRIAL TELEVISION RECEIVERS FOR THE DTMB SYSTEM

1 Scope

This International Standard specifies the basic functions, interfaces, performance requirements and test methods of the receivers for the Digital Terrestrial/Television Multimedia Broadcasting (DTMB) system. This standard can be applied to digital television terrestrial receivers carrying multiple SDTV programs or HDTV programs for both mobile and stationary receptions.

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 61937-12, *Digital audio –Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 – Part 12: Non-linear PCM bitstreams according to the DRA formats*

ISO/IEC 13818-1, *Information technology – Generic coding of moving pictures and associated audio information: Systems*

ISO/IEC 13818-2, *Information technology – Generic coding of moving pictures and associated audio information: Video*

ISO/IEC 13818-3, *Information technology – Generic coding of moving pictures and associated audio information –Part 3: Audio*

ETSI ETR 154, *Digital Video Broadcasting (DVB); Implementation guidelines for the use of MPEG-2 Systems, Video and Audio in satellite, cable and terrestrial broadcasting applications*

ETSI TS 102 366, *Digital Audio Compression (AC-3, Enhanced AC-3) Standard*

3 Abbreviations and symbols

For the purposes of this document, the following abbreviations apply.

AEF	Acceptable Error Free
BCH	Bose-Chaudhuri-Hocquenghem code
CA	Conditional Access
CAT	Conditional Access Table
C/N	Carrier-Noise ratio
Demux	Demultiplexer
DRA	Dynamic Resolution Adaptation
DTMB	Digital Terrestrial/Television Multimedia Broadcasting
ECM	Entitlement Control Message
EIT	Event Information Table

EIT p/f	EIT present/following
EMM	Entitlement Management Message
EPG	Electronic Program Guide
ES	Elementary Stream
FEC	Forward Error Correction
FS	Full Scale
HDTV	High Definition Television
ID	IDentification
LDPC	Low Density Parity Check
LFE	Low Frequency Enhancement
MDCT	Modified Discrete Cosine Transform
MPEG	Moving Pictute Experts Group
MP@HL	Main Profile at High Level
MP@ML	Main Profile at Main Level
MQAM	M-ary Quadrature Amplitude Modulation
Mux	Multiplexer
NIT	Network Information Table
PAT	Program Association Table
PCM	Pulse Code Modulation
PCR	Program Clock Reference
PES	Packetized Elementary Stream
PID	Packet Identifier
PMT	Program Map Table
PSI	Program Specific Information
PTS	Presentation Time Stamp
QAM	Quadrature Amplitude Modulation
QAM-NR	Quadrature Amplitude Modulation – Nordstrom Robinson
RF	Radio Frequency
SDT	Service Description Table
SDTV	Standard Definition Television
SI	Service Information
STC	System Time Clock
TDT	Time and Date Table
TOT	Time Offset Table
TS	Transport Stream
TPS	Transmission Parameters Signaling
UHF	Ultra High Frequency
UTC	Universal Time Co-ordinated
VHF	Very High Frequency
Y/C	Luminance/Chrominance

4 Summary of DTMB transmission system

4.1 General

This part of IEC 62753 provides the overview of the DTMB transmission system, including transmitters and receivers. Normative characteristics and requirements are provided in detail in Clauses 5 to 8.

4.2 Processing of DTMB transmitter

The digital television terrestrial broadcasting system is used to convert the input data stream to the output RF signal. The following baseband processing will be applied to the input data stream sequentially:

- Scrambling

  Pseudo random binary sequence of 2^{15-1} bit long is used to randomize the input MPEG-2 input data before the channel coding block.

- FEC

  LDPC code is used as part of the FEC. There are three different LDPC coding rates: LDPC (7 493, 3 048), LDPC (7 493, 4 572), LDPC (7 493, 6 096). A BCH (762, 752) is concatenated outside the LDPC.

- Constellation mapping

  The output binary sequence of FEC is converted to MQAM symbol stream. DTMB supports the following constellations: 64QAM, 32QAM, 16QAM, 4QAM, and 4QAM-NR.

- Interleaving

  A convolutional interleaver is utilized across many OFDM signal frames.

- Multiplex of basic data block and system information

  Each frame body consists of 36 TPS symbols and 3 744 data symbols. The total length of FB is 3 780 symbols.

- Combine the frame body and frame header to build the signal frame

  Each signal frame consists of frame header and frame body. The baseband symbol rate is 7,56 Msymbol/s. There are three different frame header lengths of 420, 595 and 945 symbols (with the relative guard interval length of 1/9, 1/6, and 1/4).

- Baseband processing

  Squared root raised cosine filter with 0,05 roll-off factor is adopted to shape the baseband signal and limit the bandwidth to 8 MHz.

After these processings, the baseband signal will be up-converted to an RF signal in UHF or VHF band.

The diagram of DTMB transmitter processing is shown in Figure 1.

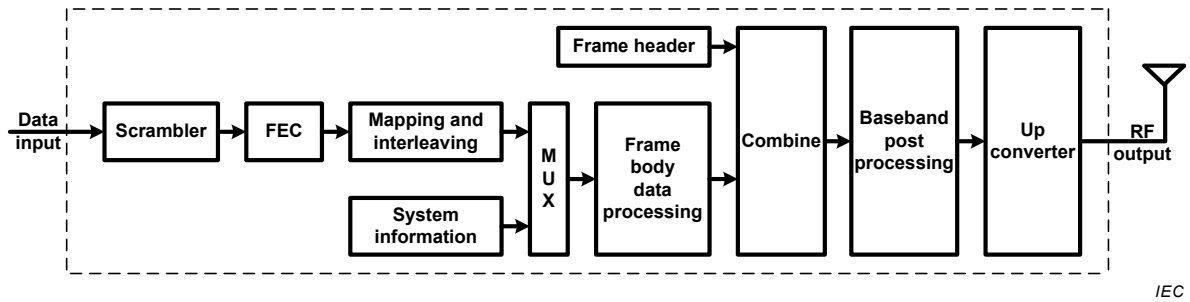

Figure 1 – Diagram of DTMB transmitter processing

4.3 Processing of DTMB receiver

A digital terrestrial television receiver completes the conversion from RF input signal to audio output and video display. First, RF input signal is demodulated to TS. The TS is demultiplexed by demultiplexing module with SI/PSI and EPG information. Then, the elementary stream is decoded by the audio/video decoding module. Finally, the audio and video signals are transported to speakers and screens.

The diagram of DTMB receiver processing is shown in Figure 2.

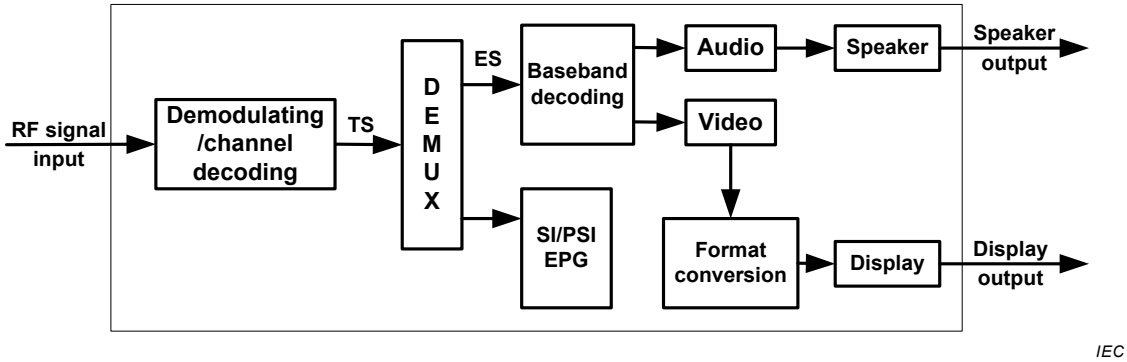

Figure 2 – Diagram of DTMB receiver processing

5 Receiver capabilities

5.1 Frequency spectrum

5.1.1 Frequency range

The receiver shall be able to receive all TV channels in the VHF and UHF bands.

5.1.2 Channel bandwidth

Channel bandwidth is 8 MHz. Effective bandwidth is 7,56 MHz.

Occupied bandwidth of each channel is $7{,}56 \times (1 + \alpha) = 7{,}938$ MHz ($\alpha = 0{,}05$).

5.1.3 Frequency acquisition range

The receiver shall be able to receive RF signal with frequency offset no more than ±150 kHz.

5.2 Power supply requirements

Power supply requirements are shown in Table 1.

Table 1 – Power supply requirements

No.	Item	Unit	Requirement
1	Power supply voltage	V	220 V $^{+10\%,-20\%}$
2	Power supply frequency	Hz	50 ± 2 %

5.3 Interface requirements

The interface requirements are shown in Table 2.