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# Methods of Measurement for Digital Terrestrial Television Receiver

地面数字电视接收机测量方法



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# Foreword

This Standard is drafted in accordance with the rules specified in GB/T 1.1-2009.

This Standard was proposed by the Ministry of Industry and Information Technology of the People's Republic of China.

This Standard shall be under the jurisdiction of the National Technical Committee 242 on Audio, Video, Multimedia System and Equipment of Standardization Administration of China (SAC/TC 242).

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# Methods of Measurement for Digital Terrestrial Television Receiver

## 1 Scope

This Standard specifies the performance measurement items, measurement conditions and measurement method of digital terrestrial television receiver (hereinafter referred to as receiver) that supports digital terrestrial television reception function specified in GB 20600-2006.

This Standard is applicable to standard definition (SD) and high definition (HD) digital terrestrial television receivers that support digital terrestrial television reception function specified in GB 20600-2006.

## 2 Normative References

The following documents are essential for the application of this Standard. For the dated normative references, only the dated editions are applicable to this document. For the undated references, the latest editions of the normative documents (including all the amendments) are applicable to this document.

GB/T 3174 Characteristics of PAL-D Television Broadcasting System

GB 3659 Methods of Measurement of Television Video Channel

GB/T 17975.1 Information Technology - Generic Coding of Moving Picture and Associated Audio Information - Part 1: System (GB/T 17975.1-2010, ISO/IEC 13818-1:2007, MOD)

GB/T 17975.2-2000 Information Technology - Generic Coding of Moving Picture and Associated Audio Information - Part 2: Video (ITU-TH, 262:1995, IDT)

GB/T 17975.3-2002 Information Technology - Generic Coding of Moving Picture and Associated Audio Information - Part 3: Audio (ISO/IEC 13818-3:1998, IDT)

GB/T 20090.2-2006 Information Technology - Advanced Coding of Audio and Video - Part 2: Video

GB 20600-2006 Framing Structure, Channel Coding and Modulation for Digital Television Terrestrial Broadcasting System

GB/T 22726-2008 Specification for Multichannel Digital Audio Coding Technology

GB/T 26270-2010 Standard Test Signals for Digital Television Receiving Equipment

SJ/T 11157-1998 Methods of Measurement on Receivers for Television Broadcast Transmissions - Part 2: Electrical Measurements on Audio Channels Methods in General and Those for Monophonic Channels

SJ/T 11180-1998 Basic Methods of Measurement of Digital Audio Characteristics of Audio and Audiovisual Equipment

SJ/T 11324-2006 Terminology of Digital Television Receiving Equipment

SJ/T 11345-2006 Methods of Measurement for Digital Television Cathode Ray Tube Displays

SJ/T 11348-2006 Methods of Measurement for Digital Television Flat Panel Displays

# 3 Terms, Definitions and Acronyms

## 3.1 Term and Definition

For the purpose of this Standard, the following terms and definitions AND the ones in SJ/T 11324-2006 apply.

### 3.1.1

**Acceptable error free [**Translator: abbreviated as error-free**]**

Error code events that are not corrected within the specified time are less than a certain threshold in the signal reception.

## 3.2 Abbreviation

AEF — Acceptable error-free;

EIT — Event information table;

EIT p/f — EIT present/following;

EPG — Electronic program guide;

MPEG — Moving Picture Experts Group;

NIT — Network information table;

PCR — Program clock reference;

PID — Packet identifier;

PMT — Program map table;

PSI — Program specific information;

SDT — Service description table;

SI — Service information;

TDT — Time and date table;

TOT — Time offset table;

UHF — Ultra high frequency;

UTC — Universal time co-ordinated;

VHF — Very high frequency.

# 4 Basic Requirements on Measurement

## 4.1 General Description

### 4.1.1 Operating conditions

Unless otherwise specified, the receivers shall be tested in the measuring conditions specified in 4.4.

### 4.1.2 Measurement site

The measurement shall be carried out in indoor room where is not subject to ambient radio frequency and low frequency electromagnet field interference; if ambient electromagnet field interferes the measuring results, the measurement shall be done in a shielded room.

The measurements on performance parameters of light and color shall be carried out in a dark room where the stray light illumination shall be less than or equal to 1 lx.

The acoustical property measurement shall be carried out in an anechoic chamber; and the anechoic chamber shall meet the relevant requirements of SJ/T 11157-1998.

### 4.1.3 Measurement environment conditions

#### 4.1.3.1 Measurement conditions

Ambient temperature: 15°C~35°C;

Relative humidity: 25%~75%;

Atmosphere pressure: 86kPa~106kPa;

Power: 220×(1±5%)V, 50×(1±2%) Hz.

**4.1.3.2** Arbitration conditions

Environment temperature:20°C±2°C;

Relative humidity: 60%~70%;

Atmosphere pressure: 86kPa~106kPa;

Power: 220×(1±2%) V, 50×(1±1%) Hz;

Power harmonic: (0~5)%.

**4.1.4** Stability time

The receiver shall steadily work at least 15min under the standard measuring conditions, in order to guarantee that the receiver performance does not obviously change along the time after the measurement begins.

## 4.2 Test Signal

See GB/T 26270-2010.

## 4.3 Measurement System and Instrument

The specific requirements are shown in Table 1.

**Table 1**

| No. | Equipment name | Requirement |
|---|---|---|
| 1 | Digital television measurement transmitter (DTMT) | Support 330 operating modes specified in GB 20600-2006 |
| 2 | Analog television measurement transmitter (ATMT) | Carrier frequency and amplitude are adjustable |
| 3 | Frequency spectrum analyzer | Frequency range: 0Hz~1GHz |
| 4 | Network analyzer | Frequency range: 10kHz~1GHz |
| 5 | Brightness/color meter | Analyze and measure brightness and color parameters |
| 6 | Audio analyzer | Have functions of audio measuring amplifier, distortion meter and so on, be equipped with 1kHz, 1/3 oct band pass filter and A-weighted wave filter meeting type-O tolerance |
| 7 | Power meter | Measurement accuracy: 0.1W |
| 8 | Stream generator (SG) | Output the test required stream |
| 9 | Gaussian noise generator (GNG) | Noise power is adjustable; belt width can be set |
| 10 | Power interference simulator | Output 50Hz sinusoidal wave signal with adjustable magnitudes |

**Figure 8**

**5.2.8.3** Measuring method

a) Connect the test system as Figure 8; and the SG outputs the standard moving picture sequence; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Adjust the TR to make its screen display pictures normally;

c) Close up the ATMT and set it at the upper adjacent channel of the DTMT; increase the output level of the ATMT till the TR fails to work normally; decrease the output level gradually till the receiver receives with acceptable error-free;

d) Record the ratio of the standard input signal level in this channel to the output level of the ATMT at this moment; and the ratio above is the adjacent upper frequency interference suppression ratio of the TR (analog television);

e) Set the ATMT at the adjacent lower channel of the DTMT; and repeat procedure c);

f) Record the ratio of the standard input signal level in this channel to the output level of the ATMT at this moment; and the ratio above is the adjacent lower frequency interference suppression ratio of the TR (analog television).

**5.2.9** Suppression to co-channel interference of analog television

**5.2.9.1** Characteristic description

Check the receiver suppression to interference of co-channel of analog television signal, expressed in dB.

**5.2.9.2** Test chart

The test chart is shown in Figure 8.

**5.2.9.3** Measuring method

a) Connect the test system as Figure 8; and the SG outputs the standard moving picture sequence; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Adjust the TR to make its screen display pictures normally;

c) Close up the ATMT and set it at the same channel of the DTMT; increase the output level of the ATMT till the TR fails to work normally; decrease the output level gradually till the receiver receives with acceptable error-free;

adjacent lower frequency interference suppression ratio of the TR (digital TV).

**5.2.11** Suppression to co-channel interference of digital television

**5.2.11.1** Characteristic description

Check the receiver suppression to interference of co-channel of digital television signal, expressed in dB.

**5.2.11.2** Test chart

The test chart is shown in Figure 9.

**5.2.11.3** Measuring method

a) Connect the test system as Figure 9; and the SG outputs the standard moving picture sequence; adjust the output level of the DTMT 1 to make the input level of the TR as the standard input level;

b) Adjust the TR to make its screen display pictures normally;

c) Set SG 2 output the standard moving picture sequence, close up DTMT 2 and set it at the co-channel of the DTMT 1; increase the output level to make the TR fail to work normally; decrease the output level of DTMT 2 gradually till the receiver receives with acceptable error-free;

d) Record the ratio of the standard input signal level of this channel to the signal level of the co-channel interference at this moment; and the ratio above is the co-channel interference suppression ratio of the TR (digital TV).

**5.2.12** 0dB echo suppression

**5.2.12.1** Characteristic description

Check the static two-path 0dB echo RF signal reception capacity of receiver. The carrier-to-noise ratio is expressed in dB and the echo time delay is expressed in μs.

**5.2.12.2** Test chart

The test chart is shown in Figure 6.

**5.2.12.3** Measuring method

a) Connect the test system as Figure 6; and the SG outputs the standard moving picture sequence; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Adjust the TR to make its screen display pictures normally;

c) Set the signal channel simulator according to multipath model;

d) Increase the subordinate path time delay till the TR fails to work normally; decrease the subordinate path time delay gradually till the acceptable error-free can be received;

e) Record the time delay of the principal path to the subordinate path at this moment, as the 0dB echo time delay of the TR;

f) Set the subordinate path time delay as 30μs, close up the GNG and increase the noise power to make the TR fail to work normally;

g) Decrease the noise power gradually till the acceptable error-free is received;

h) Record the ratio of the carrier power and the noise power at this moment, as the 0dB echo suppression ratio of the TR.

**5.2.13** Dynamic multipath suppression

**5.2.13.1** Characteristic description

Check the adaptation of the receiver to dynamic multipath channel. The carrier-to-noise ratio is expressed in dB and the Doppler frequency shift is expressed in Hz.

**5.2.13.2** Test chart

The test chart is shown in Figure 6.

**5.2.13.3** Measuring method

a) Connect the test system as Figure 6; and the SG outputs the standard moving picture sequence; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Adjust the TR to make its screen display pictures normally;

c) Set the signal channel simulator according to the multipath model; and set Doppler frequency shifts of all paths 70Hz;

d) Close up the GNG and adjust the Gaussian noise power continuously till the acceptable error-free can be received;

e) Record the ratio of the carrier power and the noise power at this moment, as the dynamic multipath carrier-to-noise ratio threshold ($C/N_1$) of the TR;

f) Adjust the power of the GNG to make the carrier-to-noise ratio 3dB higher than $C/N_1$;

**5.3.2.3** Test Method

a) Connect the test system as Figure 13; and the SG outputs the transport stream formed by two video services; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Set the TR under mute status;

c) Add random jittering with amplitude of ±500ns into the transport stream PCR;

d) Tune the TR in the transport stream with PCR jittering;

e) Observe the video image on the TR screen and verify whether the TR can receive with acceptable error-free;

f) Record the system clock recovery condition of the TR.

**5.3.3** Error control

**5.3.3.1** Characteristic description

Check whether the receiver supports the error control.

**5.3.3.2** Test chart

The test chart is shown in Figure 13.

**5.3.3.3** Measuring method

a) Connect the test system as Figure 13 to form transport streams with some errors;

b) The SG outputs the transport stream generated by procedure a); adjust the output level of the DTMT to make the input level of the TR as the standard input level;

c) Adjust the TR to make its screen display pictures normally;

d) Verify whether the TR can receive with acceptable error-free;

e) Record the error control condition of the TR.

**5.3.4** PID filtering

**5.3.4.1** Characteristic description

Check whether the receiver supports the PID filtering.

**5.3.4.2** Test chart

The test chart is shown in Figure 13.

**5.3.4.3** Measuring method

a) Connect the test system as Figure 13 to form transport streams with 32 PIDs;

b) The SG outputs the transport stream generated by procedure a); adjust the output level of the DTMT to make the input level of the TR as the standard input level;

c) Adjust the TR to make its screen display pictures normally;

d) Verify whether the TR can receive with acceptable error-free;

e) If the receiver screen displays pictures normally, step up the number of PIDs in the transport stream and repeat procedure d) till the receiver fails to receive with acceptable error-free;

f) If the receiver screen cannot display pictures normally, step down the number of PIDs in the transport stream and repeat procedure d) till the receiver can receive with acceptable error-free;

g) Record the maximum number of PID filtering packets that the TR can support.

**5.3.5** Multicomponent program treatment

**5.3.5.1** Characteristic description

Check whether the receiver supports the multicomponent program processing capacity.

**5.3.5.2** Test chart

The test chart is shown in Figure 13.

**5.3.5.3** Measuring method

a) Connect the test system as Figure 13 to form transport streams with both compatible pictures and incompatible pictures;

b) The SG outputs the transport stream generated by procedure a); adjust the output level of the DTMT to make the input level of the TR as the standard input level;

c) Verify whether the TR can receive with acceptable error-free and display all components

d) Record the treatment condition of multicomponent program that the TR can support.

## 5.4 Requirements on Transport Stream Decoding

### 5.4.1 Service and program information

#### 5.4.1.1 Characteristic description

Check whether the receiver supports the service and program information processing capacity.

#### 5.4.1.2 Test chart

The test chart is shown in Figure 13.

#### 5.4.1.3 Measuring method

a) Connect the test system as Figure 13 to form transport streams with NIT, SDT, EIT and TDT information;

b) The SG outputs the transport stream generated by procedure a); adjust the output level of the DTMT to make the input level of the TR as the standard input level;

c) Verify whether the TR can receive with acceptable error-free and process NIT, SDT, EIT and TDT information;

d) Record the condition of the service and program information processing that the receiver supports.

### 5.4.2 Electronic program guide

#### 5.4.2.1 Characteristic description

Check whether the receiver supports the electronic program guide (EPG) information processing capacity.

#### 5.4.2.2 Test chart

The test chart is shown in Figure 13.

##### 5.4.2.2.1 Measuring method

a) Connect the test system as Figure 13 to form transport streams with EPG information;

b) The SG outputs the transport stream generated by procedure a); adjust the output level of the DTMT to make the input level of the TR as the standard input level;

c) Reset the TR, clear up the selective service list and do channel search;

d) Press EPG key and start EPG;

e) Verify whether the program time table of the TR EPG lists the complete information of the tested transport stream;

f) Record the condition of the EPG processing capacity that the TR supports.

**5.4.3** Caption

**5.4.3.1** Characteristic description

Check whether the receiver supports the caption processing capacity.

**5.4.3.2** Test chart

The test chart is shown in Figure 13.

**5.4.3.3** Measuring method

a) Connect the test system as Figure 13 to form transport streams with caption information;

b) The SG outputs the transport stream generated by procedure a); adjust the output level of the DTMT to make the input level of the TR as the standard input level;

c) Verify whether the TR can receive with acceptable error-free and process the caption information;

d) Record the condition of the caption information processing capacity that the TR supports.

## 5.5 Requirements on Video Characteristics

**5.5.1** Digital video decoding

**5.5.1.1** Characteristic description

Check whether the receiver video decoding conforms to the related requirements in GB/T 20090.2-2006 and GB/T 17975.2-2000.

**5.5.1.2** Test chart

The test chart is shown in Figure 12.

**5.5.1.3** Test Method

a) Connect the test system as Figure 13 to form transport streams that conform to the video encoding requirements of GB/T 20090.2-2006or GB/T

17975.2-2000;

b) The SG outputs the transport stream generated by procedure a); adjust the output level of the DTMT to make the input level of the TR as the standard input level;

c) Tune the TR in the measuring channel and check whether the TR can receive with acceptable error-free;

d) Record the condition of the digital video decoding condition that the TR supports.

**5.5.2** Fast signal channel catching

**5.5.2.1** Characteristic description

Check whether the receiver supports the fast signal channel catching capacity.

**5.5.2.2** Test chart

The test chart is shown in Figure 12.

**5.5.2.3** Measuring method

a) Connect the test system as Figure 12 to form transport streams with the information that supports fast signal channel catching;

b) The SG outputs the transport stream generated by procedure a); adjust the output level of the DTMT to make the input level of the TR as the standard input level;

c) Verify whether the TR can fast catch channel and receive with acceptable error-free;

d) Record the condition of the fast signal channel catching capacity that the TR supports.

**5.5.3** Still picture support

**5.5.3.1** Characteristic description

Check whether the receiver supports the standstill picture processing capacity.

**5.5.3.2** Test chart

The test chart is shown in Figure 12.

**5.5.3.3** Measuring method

**5.9.2** Test chart

The test chart is shown in Figure 18.

**5.9.3** Measuring method

a) Connect the test system as Figure 18; and the SG outputs the standard moving picture sequence; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Close down all auxiliary functions of the TR;

c) Set the TR to the standby state;

d) With the power meter, read out the power consumption of the TR;

e) Record the standby power consumption of the TR as the power consumption in procedure c) status.

## 5.10 Requirements on Functions

**5.10.1** Software version update

Undetermined.

**5.10.2** Chinese language Graphic User Interface (GUI)

**5.10.2.1** Characteristic description

Check whether the receiver supports GUI.

**5.10.2.2** Test chart

The test chart is shown in Figure 13.

**5.10.2.3** Measuring method

a) Connect the test system as Figure 13; and the SG outputs the standard moving picture sequence; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Check whether the TR has GUI;

c) Record the condition of Chinese language GUI that the TR supports.

**5.10.3** Selective service list

**5.10.3.1** Characteristic description

Check whether the receiver has a GUI and provides a list of services broadcasted in

| | | |
|---|---|---|
| | V PID 2109<br>A PID 2108 | |

c) Confirm whether the transport stream in multiplexer 1 has NIT_actual and NIT_other, decrease the output signal level of DTMT 2 till the receiver fails to receive normally; do channel search by NIT;

d) Enter the selective service list and check whether it displays the service items provided by multiplexer 1;

e) Increase the output signal level of digit television transmitter 2 till the receiver can receive normally;

f) Delete all service items from the selective service list and do channel search by NIT;

g) Enter the selective service list and check whether it displays the service items provided by multiplexers 1 and 2;

h) Record whether the TR displays all services provided by multiplexer 1 in procedure d) status and whether it displays all services provided by multiplexers 1 and 2 in procedure g) status;

i) Record the condition of the selective service list establishment function that the TR supports.

**5.10.3.3** Edition of selective service list

**5.10.3.3.1** Characteristic description

Check the edition operating function of the selective service list by the receiver.

**5.10.3.3.2** Test chart

The test chart is shown in Figure 19.

**5.10.3.3.3** Measuring method

a) Connect the test system as Figure 19; and the SG outputs the standard moving picture sequence; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Check whether the TR has the service item sorting function in the selective service list and the editing function specified in the product specification;

c) Record the condition of the service list editing function that the TR supports.

**5.10.3.4** Selective service list update

**5.10.3.4.1** Characteristic description

Check whether the selective service list of the receiver updates with the change of the network service data.

**5.10.3.4.2** Test chart

The test chart is shown in Figure 19.

**5.10.3.4.3** Measuring method

a) Connect the test system as Figure 19; and the SG outputs the standard moving picture sequence; adjust the output levels of DTMTs 1 and 2 to make the input level of the TR as the standard input level;

b) Set the selective service list as Table 3 and refresh (update) the test-required service information;

**Table 3**

| | Service 1 | Service 2 |
|---|---|---|
| MUX 1<br>TS_id 1<br>Network_id 1 | SID 1100<br>S_name Test 11<br>PMT PID 1100<br>V PID 1109<br>A PID 1108 | SID 1200<br>S_name Test 12<br>PMT PID 1200<br>V PID 1209<br>A PID 1208 |
| MUX 2<br>TS_id 2<br>Network_id 2 | SID 2100<br>S_name Test 21<br>PMT PID 2100<br>V PID 2109<br>A PID 2108 | |

c) Remove a service item form the transport stream in multiplexer 1 and check whether this service item is removed from the selective service list in the condition that the TR is not confirmed by the user;

d) Remove the whole transport stream from multiplexer 1 and check whether the service items (in the selective service list of the TR) provided by multiplexer 1 are deleted;

e) Add new transport stream in multiplexer 1, i.e. adding a new service in the original transport stream; and check whether the TR gives user a prompting message "new service added" when the TR is powered up or enters the selective service list;

f) Record the condition of the update function of the selective service list that the TR supports.

**5.10.3.5** Deletion of selective service list

**5.10.3.5.1** Characteristic description

Check the deletion function of the selective service list by the receiver.

**5.10.3.5.2** Test chart

The test chart is shown in Figure 19.

**5.10.3.5.3** Measuring method

a) Connect the test system as Figure 19; and the SG outputs the standard moving picture sequence; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Check whether the selective service list has delete function to single service item or all service items;

c) Record the condition of the selective service list deletion function that the TR supports.

**5.10.4** Status bar

**5.10.4.1** Characteristic description

Check whether the receiver status bar displays the name and duration time of the current program, as well as the name and starting time of the following program.

**5.10.4.2** Display and refresh of status bar

**5.10.4.2.1** Characteristic description

Check descriptors in EIT p/f: Short_event_descriptor, Extended_event_descriptor and Content_descriptor.

**5.10.4.2.2** Test chart

The test chart is shown in Figure 19.

**5.10.4.2.3** Test Method

a) Connect the test system as Figure 19; and the SG outputs the standard moving picture sequence; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Set the status bar as Table 4 to display the required service information, and form "EIT actual and other p/f";

moving picture sequence; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Set the service information (as Table 5) required by the status bar fault tolerance test and set the parameters of content descriptor and component descriptor as Table 6;

**Table 5**

| | Service 1 | Service 2 |
|---|---|---|
| Multiplexer 1<br>TS_id 1<br>Network_id 1 | SID 1100<br>S_name Test 11<br>PMT PID 1100<br>V PID 1109<br>A PID 1108 | SID 1200<br>S_name Test 12<br>PMT PID 1200<br>V PID 1209<br>A PID 1208 |
| Multiplexer 2<br>TS_id 2<br>Network_id 2 | SID 2100<br>S_name Test 21<br>PMT PID 2100<br>V PID 2109<br>A PID 2108 | |

**Table 6**

| Content_descriptor | Component_descriptor | Content format |
|---|---|---|
| 0x01 | 0x01 | Video, 4: 3aspect ratio |
| 0x01 | 0x03 | Video, 16: 9aspect ratio<br>Without pan vectors |
| 0x02 | 0x03 | Audio stereo(2 channel) |

c) Select a service and check whether the TR will crash to the content whose specified decoding content and component descriptor are not own by the TR and whether the TR can display pictures and give audio normally for the content and component descriptor that it can encode;

d) Check the display of the status bar;

e) Record the condition of the display fault tolerance functions of the status bar that the TR supports.

### 5.10.5 User parameter setting and storage

#### 5.10.5.1 Characteristic description

Check whether the receiver has parameter storage function.

#### 5.10.5.2 Test chart

The test chart is shown in Figure 13.

**5.10.5.3** Test Method

a) Connect the test system as Figure 13; and the SG outputs the standard moving picture sequence; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Check whether the following user parameter setting functions of the TR are normal:

1) Key video display parameters — brightness, saturation, contrast and color temperature;

2) Key audio parameters — treble, bass, monophonic channel, stereo, right-left channel equalization and volume control;

3) Multi-language selection;

4) Related data on the selective service list;

c) Record the condition of the user parameter setting and storage function that the TR supports.

**5.10.6** Power-off memory

**5.10.6.1** Characteristic description

Check the power-off memory function of the receiver.

**5.10.6.2** Test chart

The test chart is shown in Figure 13.

**5.10.6.3** Test Method

a) Connect the test system as Figure 13; and the SG outputs the standard moving picture sequence; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Restart the receiver after power off; and check whether the receiver is able to recover the function state before power off;

c) Record the condition of the power-off memory function that the TR supports.

**5.10.7** Factory setting recovery

**5.10.7.1** Characteristic description

Check whether the receiver provides a function of restoring all setting preferences to the factory state so as to cancel off all selective service list, user parameter setting

b) With the stream analyzer, test and confirm whether TDT and TOT exist in the transport stream;

c) Connect to the TR and show the time and date display;

d) Check whether the shown date is same to the TDT time and check whether the shown time changes continuously;

e) Record the condition of the RTC operation function that the TR supports.

**5.10.8.3** RTC update

**5.10.8.3.1** Test chart

The test chart is shown in Figure 20.

**5.10.8.3.2** Measuring method

a) Connect the test system as Figure 20; and the SG outputs the standard moving picture sequence; adjust the output level of the DTMT to make the input level of the TR as the standard input level;

b) Confirm that TDT and TOT exist in the transport stream, set TOT without local_time_offset_descriptor and TDT; and set the date and time parameters as Table 7;

The local time offset descriptor in TOT indicates offset of local zone time and UTC time as well as date information. The "time of change" on this descriptor is a parameter item that changes with the real time. In this case, the time is set 2005-12-31, 23:57:00.

**Table 7**

| | | |
|---|---|---|
| Descriptor tag | | 0x58 |
| Descriptor length | | |
| Country code | CHN | 0x43484E |
| Country region id | Only 1 time zone | 000000 (bin) |
| Reserved | | 0 (bin) |
| Local time offset polarity | Positive time offset | 0 (bin) |
| Local time offset | 8h, Beijing Time | 0x0800 |
| Time of change | 2005-12-31 23: 57: 00 | ??? |
| Next time offset | 0h | 0x0000 |

c) Connect to the TR, wait for the TDT year changing and show the time and date display;

d) Check the date and time displayed by the TR;

e) Fill the test results into Table 8;

**Table 8**

| Test result time | Test result date | Expected result time | Expected result date | Time (Y or N) | Date (Y or N) |
|---|---|---|---|---|---|
| | | About 23:57 | 2005-12-31 | | |
| | | About 00:01 | 2006-01-01 | | |
| | | | | | |
| | | About 07:57 | 2006-01-01 | | |
| | | About 08:01 | 2006-01-01 | | |

f) Close down the TR, set local_time_offset_descriptor of TOT; and set same UTC time in TDT and TOT, see Table 9;

**Table 9**

| Test date and time | Date and time TDT, in MJD+UTC (BCD) format |
|---|---|
| 2005-12-31 | |

g) Power on the TR and check the time and date displayed by the TR;

h) Fill the test results into Table 8;

i) Record the condition of the RTC update function that the TR supports.

**5.10.9** Channel search

**5.10.9.1** Characteristic description

Check the automatic channel search and channel search with NIT.

**5.10.9.2** Automatic channel search

**5.10.9.2.1** Test chart

The test chart is shown in Figure 21.

make the input level of the TR as the standard input level;

b) Set the working frequency points of DTMTs 1, 2 and 3 respectively as DS-4, 80MHz; DS-16, 498MHz; DS-50, 810MHz;

c) Set NIT Table and SDT Table of the SI generator, as well as all digital services set on the three frequency points;

d) Initialize the receiver or remove all services in the selective service list;

e) Apply the channel search to the TR;

f) Check whether the selective service list can search out all digital services in the network;

g) Record the search result of the TR and the duration of channel search.

**5.10.10** Internal clock

**5.10.10.1** Characteristic description

Check whether the receiver has internal clock that is used to time for standby-operating mode conversion or function triggering and whether the internal clock timer can be set by the user.

**5.10.10.2** Test chart

The test chart is shown in Figure 21.

**5.10.10.3** Test Method

a) Connect the test system as Figure 21; and the SG outputs the standard moving picture sequence; adjust the output levels of DTMTs 1, 2 and 3 to make the input level of the TR as the standard input level;

b) Set the working frequency points of DTMTs 1, 2 and 3 respectively as DS-4, 80MHz; DS-16, 498MHz; DS-50, 810MHz;

c) Confirm that the TR can convert service among the three frequency points;

d) Tune the TR into a given service:

1) Set the timer of the TR;

2) Set the timer of the TR 5min faster than the current receiver time;

3) Set the TR into standby state;

e) Repeat the test procedure for different service and fill the test results in Table

10;

**Table 10**

| Start time | Services prior to the receiver shuts down | Wake-up time of receiver | Services received after the receiver wakes up | Normal or not |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

f) Record the condition of the internal actual time clock function that the TR supports.

# Appendix A

## (Normative)

## Multipath Channel Model

### A.1 Rayleigh Channel Model

Rayleigh channel model (static) is shown in Table A.1.

**Table A.1**

| Path | Amplitude /dB | Time delay /μs | Phase /(°) |
|---|---|---|---|
| Echo 1 | −7.8 | 0.518650 | 336.0 |
| Echo 2 | −24.8 | 1.003019 | 278.2 |
| Echo 3 | −15.0 | 5.422091 | 195.9 |
| Echo 4 | −10.4 | 2.751772 | 127.0 |
| Echo 5 | −11.7 | 0.602895 | 215.3 |
| Echo 6 | −24.2 | 1.016585 | 311.1 |
| Echo 7 | −16.5 | 0.143556 | 226.4 |
| Echo 8 | −25.8 | 0.153832 | 62.7 |
| Echo 9 | −14.7 | 3.324886 | 330.9 |
| Echo 10 | −7.9 | 1.935570 | 8.8 |
| Echo 11 | −10.6 | 0.429948 | 339.7 |
| Echo 12 | −9.1 | 3.228872 | 174.9 |
| Echo 13 | −11.6 | 0.848831 | 36.0 |
| Echo 14 | −12.9 | 0.073883 | 122.0 |
| Echo 15 | −15.3 | 0.203952 | 63.0 |
| Echo 16 | −16.5 | 0.194207 | 198.4 |
| Echo 17 | −12.4 | 0, 924450 | 210.0 |
| Echo 18 | −18.7 | 1.381320 | 162.4 |
| Echo 19 | −13.1 | 0.640512 | 191.0 |
| Echo 20 | −11.7 | 1.368671 | 22.6 |

### A.2 Rice Channel Model

Rice channel model (static) is shown in Table A.2.

**Table A.2**

| Path | Amplitude /dB | Time delay /μs | Phase /(°) |
|---|---|---|---|
| Main path | 0 | 0 | 0 |
| Echo 1 | −19.2 | 0.518650 | 336.0 |
| Echo 2 | −36.2 | 1.003019 | 278.2 |

| | | | |
|---|---|---|---|
| Echo 3 | −26.1 | 5.422091 | 195.9 |
| Echo 4 | −21.8 | 2.751772 | 127.0 |
| Echo 5 | −23.1 | 0.602895 | 215.3 |
| Echo 6 | −35.6 | 1.016585 | 311.1 |
| Echo 7 | −27.9 | 0.143556 | 226.4 |
| Echo 8 | −26.1 | 3.324886 | 330.9 |
| Echo 9 | −19.3 | 1.935570 | 8.8 |
| Echo 10 | −22.0 | 0.429948 | 339.7 |
| Echo 11 | −20.5 | 3.228872 | 174.9 |
| Echo 12 | −23.0 | 0.848831 | 36.0 |
| Echo 13 | −24.3 | 0.073883 | 122.0 |
| Echo 14 | −26.7 | 0.203952 | 63.0 |
| Echo 15 | −27.9 | 0.194207 | 198.4 |
| Echo 16 | −23.8 | 0.924450 | 210.0 |
| Echo 17 | −30.1 | 1.381320 | 162.4 |
| Echo 18 | −24.5 | 0.640512 | 191.0 |
| Echo 19 | −23.1 | 1.368671 | 22.6 |

## A.3 Dynamic multipath channel model

The dynamic multipath channel model is shown in Table A.3.

**Table A.3**

| Path | Amplitude /dB | Time delay /μs | Doppler category |
|---|---|---|---|
| Echo 1 | −3 | 0 | Rice |
| Echo 2 | 0 | 0.2 | Rice |
| Echo 3 | −2 | 0.5 | Rice |
| Echo 4 | −6 | 1.6 | Rice |
| Echo 5 | −8 | 2.3 | Rice |
| Echo 6 | −10 | 5 | Rice |

# Appendix B

## (Normative)

## Acceptable Error-Free

Acceptable error-free refers to: Within the specified test time, when observing the vide image on display screen that is outputted from the video decoding, there is no observable error on the video.

For the performance test, the subjective measurement period is 60s.

For the function test, the subjective measurement period is 15s.

**_____ END _____**

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