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Replacing YD/T 1592.1-2007

**Technical specification and testing methods of
electromagnetic compatibility for TD-SCDMA digital
cellular mobile communication system – Part 1: User
equipment and ancillary equipment**

**2GHz TD-SCDMA 数字蜂窝移动通信系统电磁兼容性要求和测量方
法 – 第 1 部分：用户设备及其辅助设备**

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Foreword

This part is Part 1 of the standard: Technical specification and testing methods of electromagnetic compatibility for TD-SCDMA digital cellular mobile communication system. This standard includes the following parts:

Part 1: User equipment and ancillary equipment

Part 2: Base stations and ancillary equipment

This part replaces YD/T 1592.1-2007 “Technical specification and testing methods of electromagnetic compatibility for TD-SCDMA digital cellular mobile communication system – Part 1: User equipment and ancillary equipment”.

As compared with YD/T 1592.1-2007, the main changes of this part are as follows.

- a) In the normative references, USE YD/T 1483 to replace ITU-R SM329, USE GB/T 17626.29 to replace IEC 61000-4-29.
- b) In chapter 5 of this part, CHANGE the version number of YD/T 1312 to 2008.
- c) The maximum frequency of radiation disturbance test for ancillary equipment is 6 GHz.
- d) The maximum frequency of the radiation immunity test is 2.7GHz.
- e) CHANGE the test level and performance criteria for voltage dip, short interruption, and voltage variation immunity tests.

This part is established mainly referring to GB 9254 “Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement”, GB/T 17626 series of standards, YD/T 1483 “Technical requirement and measurement method of spurious emission of radio equipment”, ETSI TS 134.124 “Universal mobile telecommunications system (UMTS) – Electromagnetic compatibility (EMC) requirements for mobile terminal and ancillary equipment”, and YD/T 1312.1 “Requirements and measurement methods of electromagnetic compatibility for radio communication equipment – Part 1: Common technical requirements”.

This part was proposed by AND shall be under the jurisdiction of the China Communications Standardization Association.

The drafting organizations of this part: Ministry of Industry and Information Technology Telecommunications Research Institute, ZTE Corporation, Huawei Technologies Co., Ltd., Datang Telecom Technology Industry Group.

Technical specification and testing methods of electromagnetic compatibility for TD-SCDMA digital cellular mobile communication system – Part 1: User equipment and ancillary equipment

1 Scope

This part specifies the electromagnetic compatibility (EMC) requirements for user equipment and ancillary equipment for the 2GHz TD-SCDMA digital cellular mobile communication system, including limits, performance criteria, and measurement methods, etc.

This part is applicable to the user equipment and the ancillary equipment for the 2GHz TD-SCDMA digital cellular mobile communication system.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this Standard.

GB/T 6113.104 Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Radiated disturbance

GB 9254 Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement

GB 17625.1 Electromagnetic compatibility – Limits – Limits for harmonic current emissions (equipment input current $\leq 16\text{A}$ per phase)

GB 17625.2 Electromagnetic compatibility (EMC) – Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current limits $\leq 16\text{A}$ per phase and not subject to conditional connection

GB/T 17626.2 Electromagnetic compatibility – Testing and measurement techniques – Electrostatic discharge immunity test

GB/T 17626.3 Electromagnetic compatibility – Testing and measurement techniques – Radio frequency electromagnetic field immunity test

GB/T 17626.4 Electromagnetic compatibility – Testing and measurement techniques – Electrical fast transient/burst immunity test

GB/T 17626.5 Electromagnetic compatibility – Testing and measurement techniques – Surge immunity test

GB/T 17626.6 Electromagnetic compatibility – Testing and measurement techniques – Immunity to conducted disturbances induced by radio-frequency fields

GB/T 17626.8 Electromagnetic compatibility – Testing and measurement techniques – Power frequency magnetic field immunity test

GB/T 17626.11 Electromagnetic compatibility – Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity test

GB/T 17626.29 Electromagnetic compatibility – Testing and measurement techniques – Voltage dips short interruptions and voltage variations on DC input power port immunity test

GB/T 21437.2 Road vehicles - Electrical disturbance from conduction and coupling – Part 2: Electrical transient conduction along supply lines only

YD/T 1312.1-2008 Requirements and measurement methods of electromagnetic compatibility for radio communication equipment – Part 1: Common technical requirements

YD/T 1977 Measurement method for radiated RF power and receiver performance of 2GHz TD-SCDMA mobile stations

YD/T 1483 Technical requirement and measurement method of spurious emission of radio equipment

3GPP TS 34.124 Universal mobile telecommunications systems (UMTS) - Electromagnetic compatibility requirements and measurement methods for mobile terminals and ancillary equipment

3 Terms, definitions and abbreviations

3.1 Terms and definitions

The following terms and definitions apply to this document.

3.1.1

Block error rate

The block error rate, the calculation of which shall be based on the estimation of the cyclic redundancy verification for each transmission block.

If the equipment has a large number of ports, it shall select a sufficient number of ports to ensure that the actual situation is simulated AND that different types of ports can be tested.

Before the test, the UE shall be in the maximum power emission state AND it shall confirm its maximum total radiated power value. The test method is as shown in YD/T 1977. The test results are recorded in the test report.

4.2 Test arrangement

4.2.1 Transmitter input end test arrangement

Appropriate normal modulation signal is produced through the internal or external signal source AND is sent into the input port of the transmitter. The external signal source shall be located outside the test environment.

SS shall ensure continuous EUT emission.

4.2.2 Transmitter output end test arrangement

SS shall be placed outside the test environment.

If the EUT contains an external 50Ω RF antenna port, AND this port is normally connected via a coaxial cable, then the useful signal for establishing a communication connection shall be fed out from this port via a coaxial cable.

If the EUT contains an external 50Ω RF antenna port, BUT this port is usually not connected to the coaxial cable, AND for the EUT which does not contain an external 50Ω RF antenna port (e.g. integral antenna equipment), then the useful signal for establishing a communication connection shall be fed out via the antenna within the test environment.

During measurement, it shall avoid the effect of the disturbance signal onto the measuring equipment.

4.2.3 Receiver input end test arrangement

SS shall be placed outside the test environment.

The frequency of the available RF input signal for providing the communication link is selected by setting the correct UTRA ARFCN. Unless the other clauses of this part have special requirements, the test shall select the UTRA ARFCN corresponding to the center frequency of the operating frequency band.

If the EUT contains an external 50Ω RF antenna port AND this port is normally connected via a coaxial cable, the useful signal for establishing a communication connection shall be fed from this port via a coaxial cable.

If the EUT contains an external 50Ω RF antenna port, BUT this port is usually not connected to the coaxial cable, AND the EUT which does not contain an external 50Ω RF antenna port (e.g. integral antenna equipment), a useful

4.4 Narrowband response of receiver

The narrowband response generated by the receiver and the transceiver during the discrete frequency test is determined by the following method.

In the immunity test, it shall monitor the BLER and speech output signal level. Both narrowband response and wideband phenomena may cause an increase in BLER or speech output signal levels. In this case, further judgment is required.

SET the test frequency offset $\pm 3.2\text{MHz}$ and REPEAT the test. If the phenomena that the BLER or speech output signal level's out-of-tolerance phenomena disappears in the single end or double end, this is narrowband response.

If the BLER or speech output signal level increase phenomena does not disappear, it may be a narrowband response caused by another disturbance signal. In this case, SET the test frequency offset $\pm 4\text{MHz}$ and REPEAT the test.

If the BLER or speech output signal level increase phenomena does not disappear at either end, it is considered a broadband phenomenon, that is, the EUT fails to pass the test.

Narrowband response shall be ignored.

4.5 Continuous disturbance measurement conditions and arrangement

Measurements shall be made in the mode in which the EUT is working with maximum disturbance.

It shall maximize the continuous disturbance of the detected radiation, for example, through moving the EUT cables and so on.

As shown in Figure 1, when the radiation continuous disturbance measurement is carried out, the communication connection is established via SS to maximize the transmission power of the EUT, AND the radiation continuous disturbance signal of the EUT is measured via the EMC test system.

5.3 EUT that cannot establish continuous communication connections

It is same as the clause 5.3 in YD/T1312.1-2008.

5.4 Methods for evaluating ancillary equipment

It is same as the clause 5.4 in YD/T1312.1-2008.

The ancillary equipment connected to the EUT shall be tested. If the ancillary equipment shall be used in conjunction with the UE, then the ancillary equipment shall be jointly tested with the UE.

5.5 Classification of EUT

It is same as the clause 5.5 in YD/T1312.1-2008.

6 Performance criteria

6.1 General

The EUT shall comply with the minimum performance criteria as specified in 6.2 and 6.3 below.

The maintaining of communication connection shall be evaluated by an indicator, which may be part of the SS or EUT.

In the case of an immunity test for ancillary equipment, if there is no separate pass or fail-to-pass criteria, it shall be connected to the transmitter, receiver and/or transceiver to judge whether the ancillary equipment passes or fails to pass.

The UE powered by on-board power supply shall also comply with the requirements of this part for the on-board UE.

The UE powered by AC power supply shall also comply with the requirements of this part for the fixed station.

6.2 Performance criteria A (continuous phenomena)

During the test, it shall establish and maintain the communication connection.

When the EUT performs data transmission mode, the BLER shall not exceed 0.01 in the test process.

When the EUT performs the call mode, if the EUT is measured by an audio BPF having a CF of 1kHz and BW of 200Hz, the audio output level of the up-link and the down-link shall be at least less than 35dB of the recorded reference level.

Table 11 -- DC Power port conductive continuous disturbance limit

Frequency range MHz	Limit, dB μ V	
	Average value	Quasi-peak value
0.15 ~ 0.5	56 ~ 46	66 ~ 56
0.5 ~ 5	46	56
5 ~ 30	50	60

Note 1: At the transitional frequency (0.50MHz and 5MHz), it shall use the lower limit.
Note 2: Within the frequency range 0.15MHz ~ 0.50MHz, the limit value decreases linearly with the logarithm of the frequency.

8.6 AC power input and output ports

8.6.1 Measurement method

The measurement is carried out in accordance with GB 9254, AND the AMN is connected to the AC power supply.

8.6.2 Limits

The conductive disturbance limits of EUT are as shown in Table 12.

Table 12 -- AC power port conductive disturbance limits

Frequency range MHz	Limit, dB μ V	
	Average value	Quasi-peak value
0.15 ~ 0.50	56 ~ 46	66 ~ 56
0.5 ~ 5	46	56
5 ~ 30	50	60

Note 1: At the transitional frequency (0.50MHz and 5MHz), it shall use the lower limit.
Note 2: Within the frequency range 0.15MHz ~ 0.50MHz, the limit value decreases linearly with the logarithm of the frequency.

8.7 Harmonic current (AC power input port)

8.7.1 Measurement method

Measurements are made in accordance with GB 17625.1.

8.7.2 Limits

USE the category A equipment limits in GB 17625.1.

8.8 Voltage fluctuation and flicker (AC power input port)

8.8.1 Measurement method

Measurements are made in accordance with GB 17625.2.

8.8.2 Limits

USE the corresponding limits in GB 17625.2.

80 ~ 2700	3
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- c) The source of the disturbance is subjected to an amplitude modulation of 80% with an audio signal of 1 kHz.
- d) The frequency sweep step in the 80 MHz ~ 1 GHz band shall be not more than 1% of the previous frequency, AND the frequency sweep step in the 1 GHz ~ 2.7 GHz band shall be not more than 0.5% of the previous frequency.

If the response of the receiver or the receiver as a part of the transceiver is narrowband response at the discrete frequency point, then this response is ignored.

The frequency of the narrowband response shall be recorded in the test report.

9.2.2 Performance criteria

The performance criteria A of clause 6.2 in this part apply to these terms.

9.3 Electrical fast transient burst immunity test

9.3.1 Test methods and grades

When the AC power port/signal/telecommunication/control port and DC power port connection cable of the fixed station and the ancillary equipment exceeds 3m, it shall make it subjected to this test.

The test shall be carried out in accordance with GB/T 17626.4 AND it shall comply with the following requirements.

- a) The test level of the signal/telecommunication/control port is an open circuit voltage of 0.5kV.
- b) The test level of the DC power input port is an open circuit voltage of 1kV.
- c) The test level of the AC power input port is open circuit voltage of 1kV.

9.3.2 Performance criteria

The performance criteria B of clause 6.3 in this part applies to these terms.

9.4 Surge (impulse) immunity test

9.4.1 Test methods and grades

The test is carried out in accordance with GB/T 17626.5, AND it shall comply with the following requirements.

- a) For the AC power port, the test level shall be 2kV (line to ground) and 1kV (line to line);

The test grade shall be as follows:

- a) The supply voltage drops by 100% for a duration of 10ms.
- b) The supply voltage drops by 100% for a duration of 20ms.
- c) The supply voltage drops by 30% for a duration of 500ms.
- d) The supply voltage drops by 100% for a duration of 5s.

9.6.1.2 DC power supply test method and grade

The test method is as shown in GB/T 17626.29. If the EUT has a backup power supply or a dual power supply, it shall be tested when the backup supply or dual power supply works.

The test grade is as shown in 9.6.2.2.

9.6.2 Performance criteria

9.6.2.1 AC power performance criteria

For the voltage dip of 100% for a duration of 10ms, voltage dip of 100% for a duration of 20ms and a voltage dip of 30% for a duration of 500ms, the performance criteria of clause 6.3 in this part applies to these items.

For the voltage interruption of voltage drop of 100% for a duration of 5000ms, it shall use the following performance criteria.

- a) If the UE is equipped with a back-up battery or connected to a back-up battery after assembly, the performance criteria B of clause 6.3 in this part applies to this clause.
- b) If the UE is powered only by the AC power supply (without the use of a back-up battery), the performance criteria C of clause 6.4 in this part applies to this clause.

If the communication connection is interrupted or the user data is lost, it shall be recorded in the test report.

9.6.2.2 DC power supply performance criteria

DC power performance criteria is as shown in Table 15, Table 16, and Table 17.

Table 15 -- Voltage dip test grade and performance criteria

Test item	Test grade % U_T	Duration s	Performance criteria
Voltage dip	70	0.01	A ¹
		1	A ¹
	40	0.01	A ¹
			A ¹