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Telecommunication Industry Standard Of the People's Republic of China

YD/T 1539-2006

Technical Requirements and Testing Methods for Reliability of Mobile Telecommunication Handset

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Preface

This Standard is developed by referencing the following environmental testing specifications for electric and electronic products:

1. GB/T 2423.1 Environmental Test Specification for Electric and Electronic Products
- Part 2: Test method Test A: Low Temperature

2. GB/T 2423.2 Environmental Test Specification for Electric and Electronic Products
- Part 2: Test method Test B: High Temperature

3. GB/T 2423.3 Basic Environmental Test Specification for Electrical and Electronic Products - Test Ca: Constant-Damp-and-Heat Test Method

4. GB/T 2423.5 Environmental Test Specification for Electric and Electronic Products
- Part 2: Test method Test Ea and Guide Rule: Shock

5. GB/T 2423.6 Environmental Test Specification for Electric and Electronic Products
- Part 2: Test Method Test Eb and Guide Rule: Collision

6. GB/T 2423.8 Environmental testing for electric and electronic products - Part 2:
Test method Test Ed: free fall

7. GB/T 2423.11 Environmental Test Specification for Electric and Electronic Products -
Part 2: Test Method Test Fd: Broadband Random Vibration --General Requirements

8. GB/T 2423.13 Environmental Test Specification for Electric and Electronic Products - Part
2: Test Method Test Fdb: Broadband Random Vibration --Reproductivity

9. GB/T 2423.18 Environmental Test Specification for Electric and Electronic Products
- Part 2: Test Method Test Kb: Salt Fog, Alternating (sodium chloride solution)

10. GB/T 2423.22 Basic environmental testing specification for electric and electronic
products - Part 2: Test method Test N: temperature change

11. GB/T 2423.43 Environmental testing for electric and electronic products - Part 2: Test
method - Mounting of components, equipment and other articles for dynamic tests including
shock (Ea), bump (Eb), vibration (Fc and Fd) and steady-state acceleration (Ca) and guidance

12. GB/T 2423.44 Basic Environmental Test Specification for Electric and Electronic
Products - Part 2: Test Method Test Eg: Spring Hammer for Knock Test

This Standard is the definition of the reliability for China Mobile Communication Handset. If the reliability-related contents in the original published specification are different from that in this specification, all are based on this Standard.

This Standard is proposed and managed by China Communications Standards Association (CCSA).

This Standard is drafted by: China MIIT Telecommunication Institute.

This Standard is written by: Yuan Weijun and He Guili.

Technical Requirement and Test Method for Reliability of Mobile Telecommunication Handset

1 Scope

This Standard defines the technical requirements and test methods for the adaptability of the environment and mechanical stress for mobile telecommunication handsets.

It is applicable for mobile telecommunication handset and it is also the reference for other mobile telecommunication terminals in addition to the handset.

2 Quoted Standards

The following standards contribute the stipulations of this Standard after being quoted. All the revision versions (excluding correction version) of the quoted standards specified with date are not applicable for the document. Users are encouraged to explore the possibility to use the latest version of the following standards. The latest versions of the quoted documents without date specified are applicable to the standard.

- GB/T 2421 Environmental Test Specification for Electrical and Electronic Products
Part 1: General
- GB/T 2423.1 Environmental Test Specification for Electric and Electronic Products -
Part 2: Test method Test A: Low Temperature
- GB/T 2423.2 Environmental Test Specification for Electric and Electronic Products -
Part 2: Test method Test B: High Temperature
- GB/T 2423.3 Basic Environmental Test Specification for Electrical and Electronic
Products - Test Ca: Constant-Damp-and-Heat Test Method
- GB/T 2423.5 Environmental Test Specification for Electric and Electronic Products -
Part 2: Test method Test Ea and Guide Rule: Shock
- GB/T 2423.6 Environmental Test Specification for Electric and Electronic Products -
Part 2: Test Method Test Eb and Guide Rule: Collision
- GB/T 2423.8 Environmental testing for electric and electronic products - Part 2: Test
method Test Ed: free fall
- GB/T 2423.11 Environmental Test Specification for Electric and Electronic Products - Part 2:
Test Method Test Fd: Broadband Random Vibration - General Requirements
- GB/T 2423.13 Environmental Test Specification for Electric and Electronic Products - Part 2:
Test Method Test Fdb: Broadband Random Vibration - Reproductivity
- GB/T 2423.18 Environmental Test Specification for Electric and Electronic Products -
Part 2: Test Method Test Kb: Salt Frog, Alternating (sodium chloride solution)
- GB/T2423.22 Environmental Test Specification for Electric and Electronic Products -
Part 2: Test Method Test N: temperature change
- GB/T 2423.43 Environmental testing for electric and electronic products - Part 2: Test
method - Mounting of components, equipment and other articles for dynamic tests including shock
(Ea), bump (Eb), vibration (Fc and Fd) and steady-state acceleration (Ca) and guidance

GB/T 2423.44 Environmental Test Specification for Electric and Electronic Products - Part 2: Test method Test Eg: Spring Hammer for Knock Test

GB/T 2424.10 Environmental Test Specification for Electrical and Electronic Products – General Rule for Atmospheric Corrosion Acceleration Test

GB/T 9286-1998 Paints and Varnishes – Cross-cut test for films

3 Technical requirements

3.1 Environment Test

3.1.1 Low temperature

3.1.1.1 Low temperature storage

Mobile telecommunication handset in power-off state is stored by $(-40\pm 3)^{\circ}\text{C}$ low temperature for 16h. After the normal atmospheric condition is recovered, the RF performance, functions, outlook and assembly shall comply with the related requirements.

3.1.1.2 Low temperature operation

After the mobile telecommunication handset in power-on state is tested by $(-10\pm 3)^{\circ}\text{C}$ low temperature for 2h, the RF performance shall comply with the related requirements.

3.1.2 High Temperature

3.1.2.1 High temperature storage

Mobile telecommunication handset in power-off state is stored by $(55\pm 3)^{\circ}\text{C}$ high temperature for 16h. After the normal atmospheric condition is recovered, the RF performance, functions, outlook and assembly shall comply with the related requirements.

3.1.2.2 High temperature operation

After the mobile telecommunication handset in power-on state is tested by $(55\pm 3)^{\circ}\text{C}$ low temperature for 2h, the RF performance shall comply with the related requirements.

3.1.3 Temperature shock

After the mobile telecommunication handset in power-off state is shocked by $(30\pm 3)^{\circ}\text{C}/(-25\pm 3)^{\circ}\text{C}$ temperature, the functions, outlook and assembly shall comply with the related requirements.

3.1.4 Shock

After the mobile telecommunication handset in power-off state is shocked by half-sine pulse with 300m/s^2 peak acceleration and 18ms pulse duration for 18 times, the functions, outlook and assembly shall comply with the related requirements.

3.1.5 Collision

After the mobile telecommunication handset in power-off state is crashed by the pulse with 250m/s^2 peak acceleration and 6ms pulse duration for 3000 times, the functions, outlook and assembly shall comply with the related requirements.

a) The test method is performed based on the related definitions in GB/T 2423.3.

b) Conditional test: Test sample is put into the chamber based on the normal state. It is installed with the matched battery with power-off. Power on and increase the humidity chamber to 40°C. Then wet it and mix the air in the chamber. When the temperature reaches to the required one and the relative humidity is 90%~95%, keep it for 48h.

c) After the conditional test, detect RF performance finally.

4.1.8 Salt frog test methods

a) The test method is performed based on the related definitions in GB/T 2423.18.

b) Conditional test: Place the unpacked test sample without the matched battery in salt frog chamber, and spray the frog for 2 hours in (15~35)°C, the pH value is within 6.5~7.2 (when the temperature is 20°C±2°C), and the density of sodium chloride solution is (50±1)%. After the completion of frog spraying, move the test sample to damp-heat chamber for 22 hours; the storage temperature is (40±2)°C, and the relative humidity is 90%~95%.

Spray the frog and place it according to the above specification, which constitutes a cycle. Perform the test for 3 cycles according to the severity requirements.

For the test method and the salt spray sedimentation rate, see the requirements in GB2423.18 and GB2424.10.

c) After the conditional test, the test sample tests the functions, outlook and assembly.

4.1.9 Test methods in gritty dust

a) The test method is performed based on the related definitions in GB/T 2423.37.

b) Conditional test: Test sample is not packed or installed the matched battery to fix on the suitable gritty dust chamber correctly. The integrated volume shall not exceed 1/3 valid chamber space, the bottom area shall not exceed 1/2 valid horizontal area, and the distance between test samples and test samples and the inner wall of the chamber shall be not less than 100mm. During the test, the temperature in the test chamber is 15C~35°C with the relative humidity 45C~75°C. The flow velocity in the chamber shall ensure the test dust falls down the test sample slowly and the maximum shall not exceed 2m/s.

c) After the blow is stopped, the test sample is not taken out until the dust is fallen completely.

d) After the conditional test, the test sample tests the functions, outlook and assembly.

4.2 Mechanical stress test methods

Mechanical stress test has a destructive nature. This section is not required for the test sample to perform the superposed test.

4.2.1 Crash test methods

a) The test method is performed based on the related definitions in GB/T 2423.44.

b) Conditional test: Power the matched battery on the test sample; rely on the steel supporting surface in power-off state, use the spring hammer to strike the different part of the display for 5 times with (0.2±0.02)J.

c) After the conditional test, the test sample tests the functions, outlook and assembly.

freely onto the concrete surface, two times each surface, and 12 times for 6 surfaces in total.

c) After the conditional test, detect the functions, outlook and assembly.

4.2.5 Test Methods of Interface Lifetime for Mobile Telecommunication Handset and Accessory

a) Conditional test: Fix the test sample on the test equipment and insert/remove the matched earphones, charger, battery and SIM card repeatedly with 10~20 times per minute.

b) After the completion of test, check whether the battery is dropped or can be supplied properly, whether the charger and the headset work properly. The test sample can dial a call properly.

4.2.6 Buttons Lifetime

a) Conditional test: Fix the test sample on the tester, without packaging and in power off status, press any one of the keys with a force no less than 0.6N and 40~60 times/min press rate. The separate switch buttons are pressed for 50,000 times and other buttons for 100,000 times.

b) After the conditional test, detect the functions, outlook and assembly.

4.2.7 Unfold (Slide) Lifetime

a) Conditional test: The test sample is not packed and is installed with the attached battery in power-off state to fix on the test equipment. Take unfold (slide) for 50,000 times in 25~35 times/min. For the sample with rotating unfold function, first perform the unfold test and then rotating test in 10~20 times/min for 3000 times.

b) After the conditional test, detect the functions, outlook and assembly of the unfold (slide) sample.

4.2.8 Surface Antifriction Capability

a) Conditional test: Fix the test sample on the friction tester, adjust the load of the friction tester to 175g, and enable the friction tester to make the continuous friction in the test part by the tape for 16m.

b) After the conditional test, detect the appearance of the test surface.

4.2.9 Surface Coating Adhesion

a) The test method is performed based on the related definitions in GB/T 9286.

b) Conditional test: Use 6-knife multi-blade cutter or single-blade cutter with 1mm interval (orientation and blade interval device) to cut 25 cells with 1mm² for each cell in the plat area of the test sample in first horizontal and then vertical manner. All cuts shall be cut to the surface of the substrate. The areas cut slightly by soft brush or paper shall be cleared the pieces. Perform the operation by 3M 600 tapes based on section 7.2.6 in GB/T9286-1998.

c) After the conditional test, check the proportion of paint off from the substrate by the LED magnifier.