

ICS 31.060.70
CCS K 42



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 17702.1-1999

**Capacitors for power electronics
(English Translation)**

Issued on: January 1, 1970

Implemented on: January 1, 1970

**Issued by: State Administration of Market Supervision and
Administration**

Table of Contents

Preface
1 Scope
2 Normative references
3 Terms and definitions
4 Conditions of use
4.1 Normal use conditions
4.1.1 Overview
4.1.2 Altitude
4.1.3 Maximum operating temperature (θ_{Tmax})
4.1.4 Operating temperature under forced cooling
4.2 Abnormal use conditions
5 Quality requirements and tests
5.1 Test requirements
5.1.1 Overview
5.1.2 Test conditions
5.2 Test classification
5.2.1 Overview
5.2.2 Routine test
5.2.3 Type test
5.3 Capacitance and $\tan\delta$ measurement
5.3.1 Measurement procedure
5.3.2 Allowable deviation of capacitance
5.3.3 Requirement of loss tangent ($\tan\delta$)
5.4 Loss tangent ($\tan\delta$) measurement
5.4.1 Measurement
5.4.1.1 Overview
5.4.1.2 AC capacitor
5.4.1.3 DC capacitor
5.4.2 Loss tangent requirements
5.5 Voltage test between terminals
5.5.1 Overview
5.5.2 Routine test

- 5.5.3 Type test
- 5.6 AC voltage test between terminal and enclosure
 - 5.6.1 Routine test
 - 5.6.2 Type test
- 5.7 Internal discharge device test
- 5.8 Tightness test
- 5.9 Impulse discharge test
- 5.10 Thermal stability test
 - 5.10.1 Overview
 - 5.10.2 Measurement procedure
- 5.11 Self-healing test
- 5.12 Resonance frequency measurement
- 5.13 Environmental test
 - 5.13.1 Temperature changes
 - 5.13.2 Constant damp heat test
- 5.14 Mechanical test
 - 5.14.1 Terminal mechanical test
 - 5.14.2 Visual inspection
 - 5.14.3 Vibration and shock
- 5.15 Durability test
 - 5.15.1 Overview
 - 5.15.2 Pre-treatment of the unit before the test
 - 5.15.3 Initial capacitance and loss tangent measurement
 - 5.15.4 Durability test
 - 5.15.5 Final capacitance and tandelta measurement
 - 5.15.6 Acceptance criteria
- 5.16 Destruction test
 - 5.16.1 Overview
 - 5.16.2 Test sequence for AC capacitors
 - 5.16.3 Test sequence for DC capacitors
- 5.17 Isolation test of internal fuse
 - 5.17.1 Overview
 - 5.17.2 Isolation requirements
 - 5.17.3 Tolerance requirements
 - 5.17.4 Test procedure

- 5.17.5 Capacitance measurement
- 5.17.6 Visual inspection
- 5.17.7 Voltage test
- 6 Overload
- 7 Safety requirements
 - 7.1 Discharge device
 - 7.2 Housing connection
 - 7.3 Environmental protection
 - 7.4 Other safety requirements
- 8 Sign
- 9 Installation and Operation Guidelines
 - 9.1 General
 - 9.2 Selection of rated voltage
 - 9.3 Operating temperature
 - 9.3.1 Overview
 - 9.3.2 Installation
 - 9.3.3 Abnormal cooling conditions
 - 9.4 Special conditions of use
 - 9.5 Overvoltage
 - 9.6 Overcurrent
 - 9.7 Switching and protection devices
 - 9.8 Selection of creepage distance and electrical clearance
 - 9.8.1 Creepage distance
 - 9.8.2 Air gap
 - 9.9 Connection
 - 9.10 Parallel connection of capacitors
 - 9.11 Series connection of capacitors
 - 9.12 Magnetic losses and eddy currents
 - 9.13 Protection guidelines for internal fuses and isolators inside capacitors
 - 9.14 Guidelines for unprotected capacitors
- Appendix A (informative) Waveform
- Appendix B (Normative) Capacitor operating limit with sinusoidal voltage as a function of frequency at maximum temperature (θ_{max})
- Appendix C (normative) Resonant frequency measurement method---Example
 - C.1 Method 1

C.2 Method 2

References

Foreword

This document is in accordance with GB/T 1.1-2020 "Guidelines for Standardization Part 1: Structure and Drafting Rules of Standardization Documents".

To be drafted.

This document replaces GB/T 17702-2013 "Power Electronic Capacitors", compared with GB/T 17702-2013, except for structural adjustment and compilation in addition to the editorial changes, the main technical changes are as follows.

- Modified the content of the scope (see Chapter 1, Chapter 1 of the 2013 edition);
- Updated normative reference documents (see Chapter 2, Chapter 2 of the 2013 edition);
- Added the terms and definitions of "safety protection", "thermal balance", "thermal time constant" and "hot spot temperature" (see Chapter 3);
- Deleted the time regulation in the impulse discharge test (see 5.9 in the 2013 edition);
- Further clarified the requirements for cooling temperature in the thermal stability test and measurement procedure, and aimed at pure AC capacitors with a single frequency the maximum reactive power is specified (see 5.10.2, 5.10.2 in the 2013 edition);
- Modified the test voltage value of the AC capacitor in the self-healing test, 1.5UN was revised to 2.15UN (see 5.11, 5.11 in the 2013 edition);
- Added the relevant provisions of the thermal balance and interruption voltage in the durability test, and clarified the "Final measurement of the ambient temperature and the initial measurement the deviation of the ambient temperature record of the quantity should be within $\pm 2^{\circ}\text{C}$ " (see 5.15, 5.15 of the 2013 edition);
- In the criterion of the destruction test, amend "Self-healing capacitors of isolated design or special non-isolated design" to "use fused isolation Self-healing capacitors designed to be separated" (see 5.16.2, 5.16.2 in the 2013 edition).

The translation method used in this document is equivalent to IEC 61071:2017 "Power Electronic Capacitors".

The Chinese documents that have consistent correspondence with the normatively cited international documents in this document are as follows.

- GB/T 2423.3-2016 Environmental Test Part 2: Test Method Test Cab. Constant Humidity Test (IEC 60068-2-78:2012, IDT);