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GB/T 22319.11-2018

Measurement of quartz crystal unit parameters -- Part 11: Standard method for the determination of the load resonance frequency fL and the effective load capacitance C Leff using automatic network analyzer techniques and error correction

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Foreword

GB/T 22319 "Measurement of Quartz Crystal Element Parameters" is divided into the following parts.

--- Part 1. Basic method for measuring the resonant frequency and resonant resistance of a quartz crystal element using the pi-network zero-phase method;

--- Part 2. The phase offset method for measuring the dynamic capacitance of a quartz crystal element;

---Part 4. Measurement methods for load resonance frequency and load resonance resistance RL for quartz crystal elements with frequency up to 30 MHz and others

The calculation of the derived parameter;

--- Part 5. Methods for determining equivalent electrical parameters using automatic network analysis techniques and error correction;

--- Part 6. Measurement of stimulus level correlation (DLD);

--- Part 7. Measurement of the activity jump of quartz crystal elements;

--- Part 8. Measurement fixtures for surface mounted quartz crystal components;

--- Part 9. Measurement of spurious resonance of a quartz crystal element;

---Part 11. Standards for Determining Resonance Frequency and Effective Load Capacities of Loads Using Automatic Network Analysis Techniques and Error Correction

method.

This part is Part 11 of GB/T 22319.

This section was drafted in accordance with the rules given in GB/T 1.1-2009.

This section uses the translation method identical to the use of IEC 60444-11.2010 "Measurement of Quartz Crystal Element Parameters. Part 11. Using Automatic

Network Analysis Techniques and Error Corrections Standard Methods for Determining Load Resonance Frequency fL and Effective Load Capacitor CLeff.

The Chinese documents that have a consistent correspondence with the normatively quoted international documents in this section are as follows.

--- GB/T 12273.1-2017 Qualified quartz crystal elements - Part 1. Generic specification (IEC 60122-1.2002,

MOD)

--- SJ/T 11210-1999 Measurement of Quartz crystal element parameters - Part 4. Quartz crystal elements up to 30 MHz

Calculation of load resonant frequency fL and load resonance resistance RL and calculation of other derived parameters (IEC 60444-4.1988,

IDT)

This section made the following editorial changes.

---3.1 "The load resonance frequency fL is the lower of the two frequencies" is replaced by "In practice, the load resonance frequency fL is two frequencies.

The lower frequency of the rate";

In the denominator of (5) in (a)-(4.2b), "Z3(V2-V2)" is replaced by "Z3(V1-V2)";

--- Illustration in Figure 2, the dashed line indicates that "XC (ohm)" is changed to "VC", and the solid line indicates that "VC" is changed to "XC (ohm)".

1 Scope

This part of GB/T 22319 specifies that when the figure of merit M of the quartz crystal element is greater than 4, the nominal load capacitance CL corresponds to the quartz crystal

The method of measuring the resonant frequency fL of the component load and the effective load capacitance CLeff at the nominal frequency.

According to the definition in Table 1 of IEC 60122-1.2002, M is characterized by formula (1).

M =

gamma =

omegaC0R1

(1)

In the formula.

M --- the merit of the quartz crystal element;

Q --- quality factor;

gamma ---capacitance ratio;

omega --- angular frequency in radians per second (rad/s);

C0 --- parallel capacitor in equivalent circuit, unit Farah (F);

R1-dynamic resistance in the equivalent circuit in ohms (ohm).

When the frequency reaches.200MHz and below, this part can get good results, and can calculate the load resonance frequency offset deltafL.

Traction sensitivities S are calculated according to the traction ranges deltafL1, L2 and as defined in 2.2.31 of IEC 60122-1.2002. With IEC 60444-4

In contrast to the simple measurement, this measurement technique avoids the use of physical load capacitors and therefore has higher measurement accuracy, better reproducibility and

Application. This section also breaks through the upper frequency limit of 30 MHz for IEC 60444-4, with an upper limit of.200 MHz. This section is based on

SJ/T 11211-1999 error-corrected measurement technique, so no need to change the test fixture while determining fL and CLeff

Multiple equivalent electrical parameters of a British crystal element.

In this section, when the reactance XC of the quartz crystal and the reactance XCL of the load capacitor are equal in magnitude and opposite signs, the frequency fL is obtained.

[see equation (2)].

XC=-XCL=

omegaLCL

(2)

In the formula.

XC --- reactance of quartz crystal in ohms (ohm);

XCL---The reactance of the load capacitance, in ohms (ohm);

omegaL --- angular frequency with load capacitance in radians per second (rad/s);

CL --- Load capacitance in Farads (F).

In addition, this part can also measure the effective load capacitance CLeff at the nominal frequency fnom.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article

Pieces. For undated references, the latest version (including all amendments) applies to this document.

SJ/T 11211-1999 Measurement of Quartz Crystal Element Parameters - Part 5. Use of Automatic Network Analysis Techniques and Error Correction