



XF-1715 FRA 频率特性分析仪

Frequency Response Analyzer
Measuring Frequency : 1Hz to 15MHz



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环路分析 / 传输特性分析 / 阻抗分析 / 相位增益分析
Loop analysis/transmission characteristic analysis/impedance analysis/phase gain analysis

XF-1715

FRA频率特性分析仪

FRA Frequency Response Analyzer

介绍

INTRODUCTION

频率特性分析仪（FRA）是一款能够在1Hz~15MHz频率范围内精确测量输入信号的振幅（增益）和相位差的精密仪器。包含一路信号源输出（OSC）和两路测试输入通道（CH1、CH2）。可用于负反馈环路的稳定性分析（特别是针对开关电源的环路特性的测试），电路输出阻抗测试，电路的传输特性测试，元器件的阻抗测试等。

仪器需配合上位机软件使用，仪器通过USB数据线和上位机（PC）进行通讯。利用上位机软件可以非常方便地对仪器进行操作，并完成相应的测试项目。软件中共包含六种测试模式供用户选择，分别是：环路增益测试（Loop Gain）、传输特性测试（Transfer）、阻抗测试（impetance）、LCR模式（Component LCR）、幅度/相位模式（Amplitude/phase）、波形模式（Waveform Scope）。

Frequency Characteristic Analyzer (FRA) is a precision instrument that can accurately measure the amplitude (gain) and phase difference of input signals in the frequency range of 1Hz to 15MHz. Includes one signal source output (OSC) and two test input channels (CH1 / CH2). It can be used for stability analysis of negative feedback loop (especially for testing the loop characteristics of switching power supply), circuit output impedance test, circuit transmission characteristics test, component impedance test, etc.

The instrument needs to be used with PC software, and the instrument communicates with PC through USB data cable. The upper computer software can be used to operate the instrument very conveniently and complete the corresponding test items. The software includes six test modes for users to choose from: Loop Gain Test (Loop Gain), transmission characteristic test (Transfer), impedance test (impetance), LCR mode (Component LCR), amplitude/phase mode (Amplitude/phase) and Waveform mode (Waveform Scope).





- 波形测试
 - 电源抑制比(PSRR)测量
 - 电源输出阻抗测量
 - 电子元件的阻抗(LCR)测量
 - 电路传输特性测量
 - 振幅、增益和相位测量
 - 各类电源的环路特性测量
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- waveform test
 - measurement of power supply rejection ratio (PSRR)
 - power output impedance measurement
 - impedance (LCR) measurement of electronic components
 - measurement of circuit transmission characteristics
 - amplitude, gain and phase measurement
 - measurement of loop characteristics of various power supplies

技术规格

Technical specifications

振荡器部分

输出波形：正弦波
频率：1Hz ~ 15MHz
设定步进：1Hz
精确度：±2ppm
AC振幅：0V ~ 10Vpeak（无负载时）
DC偏置：-10V ~ 10V（无负载时）
频率扫描：对数/线性扫描
绝缘：600Vpeak（对机箱、对分析输入）
接口：BNC

Oscillator part

Output waveform: sine wave
Frequency: 1Hz to 15MHz
Set step: 1Hz
Accuracy: ± 2ppm
AC amplitude: 0V to 10Vpeak (without load)
DC offset: -10V to 10V (without load)
Frequency scan: Logarithmic/linear scan
Insulation: 600Vpeak (for chassis and analysis input)
Interface: BNC

分析输入部分

输入通道数：2通道（CH1、CH2）
输入阻抗：1MΩ|24pF
绝缘：600Vpeak（对机箱、振荡器部分、
分析输入通道之间）
动态量程：>120 dB
分析模式：Ratio: CH1/CH2、CH2/CH1
接口：BNC

Analysis input section

Number of input channels: 2 channels (CH1, CH2)
Input impedance: 1 Mohm | 24pF
Insulation: 600Vpeak (for chassis and oscillator
parts, Analyze input channels)
Dynamic range: >120 dB
Analysis mode: Ratio: CH1/CH2, CH2/CH1
Interface: BNC

产品特点

Product Features

- 测量频率：1Hz ~ 15MHz。
- 增益精度 ± 0.05 、相位精度 $\pm 0.2^\circ$ 。
- 动态量程 >120dB。
- 自动量程选择。
- 分段注入功能，不同频率段输出不同幅度注入信号，最大限度提高整体灵敏度。
- 简易示波器模式，实时显示输入波形。
- 输入振幅、相位显示。
- 通过USB接口与电脑通信，上位机软件控制，界面直观易于使用。
- 一键打印报告。
- 图文数据保存。
- 测量误差

CH1/CH2或CH2/CH1	$\leq 100\text{KHz}$	$\leq 2\text{MHz}$	$\leq 10\text{MHz}$	$\geq 10\text{MHz}$
幅度比	$\pm 0.05\text{dB}$	$\pm 0.1\text{dB}$	$\pm 0.1\text{dB}$	$\pm 0.3\text{dB}$
相位差	$\pm 0.2^\circ$	$\pm 0.25^\circ$	$\pm 0.5^\circ$	$\pm 1^\circ$

Note: 校准完毕，输入电压100mVpeak为条件。

- 显示
图形：伯德图、阻抗图、电阻值、电容值、电感值、Q（品质因数）值、D（损耗因数）值、实时波形图（时域）

测量数据显示：增益/振幅（线性、对数）、相位差可放大显示

- 其他
控制接口：USB2.0
电源：85 ~ 220VAC
功耗：30W MAX

- measurement frequency: 1Hz to 15MHz
- gain accuracy ± 0.05 , phase accuracy $\pm 0.2^\circ$
- dynamic range > 120dB
- Automatic range selection
- segmented injection function, different frequency segments output different amplitude injection signals to maximize the overall sensitivity.
- simple oscilloscope mode to display input waveform in real time.
- input amplitude and phase display.
- Communicate with computer through USB interface, control by PC software, and the interface is intuitive and easy to use.
- print the report with one click.
- Save graphic data.
- measurement error

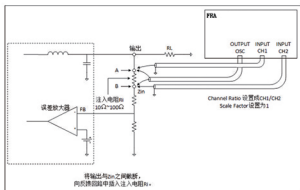
CH1/CH2 TO CH2/CH1	$\leq 100\text{KHz}$	$\leq 2\text{MHz}$	$\leq 10\text{MHz}$	$\geq 10\text{MHz}$
Amplitude ratio	$\pm 0.05\text{dB}$	$\pm 0.1\text{dB}$	$\pm 0.1\text{dB}$	$\pm 0.3\text{dB}$
Phase difference	$\pm 0.2^\circ$	$\pm 0.25^\circ$	$\pm 0.5^\circ$	$\pm 1^\circ$

Note: After the calibration is completed, the input voltage is 100mVpeak.

- Display
Graph: Bode diagram, impedance diagram, resistance value, capacitance value, inductance value, Q (quality factor) value, D (loss factor) value, real-time waveform diagram (time domain)
Measurement Data Display: gain/amplitude (linear, logarithmic), phase difference can be enlarged display
- Others
Control Interface: USB2.0
Power supply: 85 ~ 220VAC
Power consumption: 30W MAX

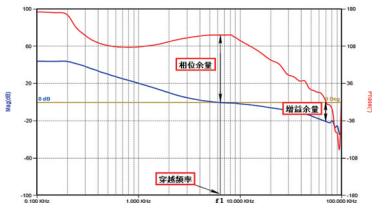
电源环路分析

为AC-DC/DC-DC电源提供环路分析功能，通过测量环路增益的幅度和相位，获取相位裕量、增益裕量以及环路带宽（穿越频率），帮助用户定量分析电源的环路特性。输入端口具备600Vpeak的隔离和耐压，可用于PFC环路的测试。内部隔离，无需外置隔离变压器，简单、易用。



Power loop analysis

Provides loop analysis for AC-DC/DC-DC power. By measuring the amplitude and phase of loop gain, phase margin, gain margin, and loop bandwidth (crossing frequency) are obtained, helps you quantitatively analyze the loop characteristics of the power supply. The input port has 600Vpeak isolation and withstand voltage, which can be used for the test of the PFC loop. Internal isolation, without external isolation transformer, is simple and easy to use.

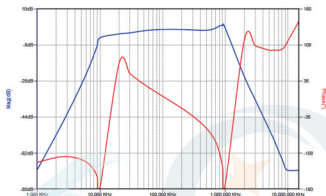
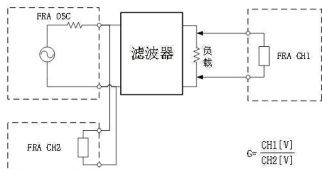


传输特性测试

仪器对电路传输网络进行传输特性的测试，如放大器电路、光电耦合器电路、滤波器电路等，获得其增益及相位随频率变化的曲线。

Transmission characteristic test

The instrument tests the transmission characteristics of the circuit transmission network, such as amplifier circuit, photocoupler circuit, filter circuit, etc., to obtain the curve of its gain and phase changing with frequency.



仪器功能

Instrument function

阻抗分析/LCR测试

结合测试夹具，使用RF-IV测试技术，仪器可对电源输出阻抗、元器件（电容、电感、电阻、变压器等）阻抗进行精密测量，获得阻抗/相位随频率变化的曲线。仪器还带LCR表功能，可以测量阻容感器件的元件值、Q值、D（损耗）值，支持单频点和扫频设置，频率范围1Hz ~ 15MHz。

Impedance Analysis/LCR test

Combined with Test fixture and RF-IV test technology, the instrument can accurately measure the output impedance of power supply and the impedance of components (capacitance, inductance, resistance, transformer, etc.), obtain the impedance/phase curve with frequency. The instrument also has the function of LCR meter, which can measure the component value, Q value and D (loss) value of the resistance and capacitance sensing device. It supports single frequency point and sweep frequency setting, and the frequency range is 1Hz ~ 15MHz.

阻抗模式切换开关：对LCR/器件阻抗和电源输出阻抗两种模式进行切换！

Impedance mode switching switch: switch the LCR/device impedance and power output impedance modes!

插件测试夹：用来固定“插件类被测件”！

Plug-in test clip: used to fix plug-in tested parts!

SMD测试夹：用来固定“贴片类被测件”以及对板载测试点（如电源输出测试点）进行测试！

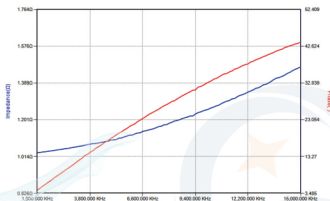
SMD test clip: It is used to fix "patch tested parts" and test the on-board testpoint (such as the power output testpoint)!



插件夹控制按钮：用来控制插件测试夹的开合！

Plug-in clip control button: used to control the opening and closing of plug-in test clip!

接SMD测试夹/SMD test clip



仪器功能

Instrument function

幅度和相位测试

仪器可对外部输入信号的幅度和相位差进行精密测试。显示输入信号的绝对幅度值、两路输入信号之间的幅度和相位差。

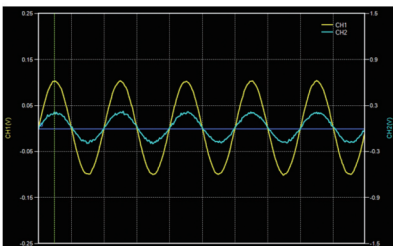


Amplitude and phase test

The instrument can precisely test the amplitude and phase difference of external input signals. Displays the absolute amplitude value of the input signal, the amplitude ratio and phase difference between the two input signals.

波形测试（简易示波器）

仪器附带简易示波器功能，用来简单观测测试电路测试点的时域波形，测量带宽为200KHz。



Waveform test (simple oscilloscope)

The instrument is equipped with simple oscilloscope function, which is used to simply observe the time domain waveform of test circuit testpoint, and the measurement bandwidth is 200kHz.



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