Tektronix®

校 准 证 书

CALIBRATION CERTIFICATE

证书编号: TSS0058016-20240624-1
Certificate No.

送校单位: 北京昂升科技有限公司
Customer /

单位地址: 北京市昌平区科星西路106号院6号楼1410室
Address /

被校样品: Oscilloscope Calibrator
DUT

仪器型号: 9500B
Model

制造厂商: FLUKE
Manufacturer

序 列 号: 331470594
Serial Number

软件/固件版本: 4.09
SW/FW Version

Tektronix证明校准所用的标准设备的量值可溯源至国家基准，其计量单位采用国际单位制(SI)计量单位和国家选定的其他计量单位。本校准符合ISO/IEC 17025:2017(CNAS-CL01)要求。

Tektronix certifies the used calibration standards traceable to National Primary Standards of P.R.C. that are linked to the international system of units(SI) and other units adopted by the P.R.C This calibration complies ISO/IEC 17025:2017 (CNAS-CL01)requirements.

本实验室通过了:
This laboratory is accredited by

- ISO9001:2015国际质量体系认证，认证机构DEKRA，证书编号：112237.00。
- DEKRA for ISO9001:2015 Quality Management System, Certificate No. 112237.00.
- 中国合格评定国家认可委员会的认可，认可证书号：国家认可委 CNAS L3429。
- China National Accreditation Service for Conformity Assessment (CNAS), Certificate No. CNAS L3429.

接收情况: 在接受区间内
Received Condition In Acceptance Interval

接收日期: 2024/06/19
Received Date

校准结果: 所校项目在接受区间内
Calibration Result All Items Calibrated in Acceptance Interval

校准日期: 2024/06/24
Calibration Date

校　准: 王 楠
Calibrated By

核　验: 林 磊
Checked By

批　准: 王公森
Approved By

签发机构(专用章):
Issued By

签发日期: 2024/06/24
Issue Date

TEKTRONIX (CHINA) CO., LTD. BEIJING BRANCH COMPANY
泰克科技(中国)有限公司北京分公司
CALIBRATION SEAL 校准专用章

本校准证书仅对所校样品有效，未经本实验室的书面批准，本证书不能部分复制。
This certificate applies only to the calibration sample above and shall not be reproduced, except in full, without the written approval of the calibration facility.

证书编号: TSS0058016-20240624-1
Certificate No.

校准技术依据: JJG 278-2002 示波器校准仪检定规程
Reference Documents
JJG 278-2002 V.R. of Oscilloscope Calibrator

注/Notes: C.S.-Calibration Specification; V.R.-Verification Regulation

校准环境条件及地点:
Calibration Environment Condition and Location

温　　度: 22.6 ° C
Temperature

相对湿度: 43.5 %
Relative Humidity

校准地点: 泰克北京校准实验室-303房间
CAL Location
Tektronix Beijing Cal Lab: RM303

其他: /
Others

实验室地址：北京市朝阳区酒仙桥路6号院7号楼1至19层101内3层303室
Calibration Lab Address: Room303, 3/F, Building #7, No.6 Jiuxianqiao Road, Chaoyang District, Beijing

本次校准所使用的主要标准测量器具
Measurement Standards Used In This Calibration

标准设备名称 STD Names	型号 / 规格 Type	出厂编号 Serial Number	有效期至 Due Date	溯源至及证书编号 Traceable to & Certificate Number
Universal Counter	53131A	3736A21063	2025/03/18	TEK(NIM)/TSS256204129-20240318-1
Multimeter	3458A	US28033413	2025/02/05	TEK(BOIMT)/TSS256206724-20240205-1
Decade Resistor	DB62	807019	2025/03/13	TEK(BOIMT)/TSS256207413-20240313-1

标准测量器具的溯源说明
Traceability Explanation of Measurement Standards

NIM: 中国计量科学研究院
National Institute of Metrology

CIMM: 中国航空工业集团公司北京长城计量测试技术研究所
Beijing Changcheng Institute of Metrology & Measurement, AVIC

BIM: 北京市计量检测科学研究院
Beijing Institute of Metrology

BOIMT: 北京东方计量测试研究所
Beijing Orient Institute of Measurement & Test

TEK: 泰克科技(中国)有限公司北京分公司
Tektronix (China) Co., Ltd Beijing Branch

TEK(NIM): 表示TEK校准且外部溯源至NIM
TEK calibration and external traceable to NIM

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校准数据报告

CALIBRATION DATA REPORT

证书编号: TSS0058016-20240624-1
Certificate No.
数据类型: Found-Left
Data Type

校准项目 Step/Operation	标准值/标称值 STD Value/Nominal Value	容许下限 Lower Limit	测量值 Measured Value	容许上限 Upper Limit	扩展不确定度 *U* (*k*=2)	结果 Result
PHYSICAL APPEARANCE CHECK						Pass
DC Voltage Accuracy						
1.0000 mV	1.0000 mV	0.9748 mV	0.9924 mV	1.0252 mV	0.0069 mV	Pass
1.9000 mV	1.9000 mV	1.8745 mV	1.8892 mV	1.9255 mV	0.0057 mV	Pass
2.3000 mV	2.3000 mV	2.2744 mV	2.2910 mV	2.3256 mV	0.0072 mV	Pass
5.0000 mV	5.0000 mV	4.9738 mV	4.9897 mV	5.0262 mV	0.0053 mV	Pass
6.0000 mV	6.0000 mV	5.9735 mV	5.9908 mV	6.0265 mV	0.0054 mV	Pass
19.0000 mV	19.0000 mV	18.9702 mV	18.9892 mV	19.0298 mV	0.0062 mV	Pass
23.0000 mV	23.0000 mV	22.9692 mV	22.9900 mV	23.0308 mV	0.0055 mV	Pass
50.0000 mV	50.0000 mV	49.9625 mV	49.9861 mV	50.0375 mV	0.0070 mV	Pass
60.0000 mV	60.0000 mV	59.9600 mV	59.9871 mV	60.0400 mV	0.0068 mV	Pass
190.0000 mV	190.0000 mV	189.9275 mV	189.9730 mV	190.0725 mV	0.0085 mV	Pass
230.0000 mV	230.0000 mV	229.9175 mV	229.9818 mV	230.0825 mV	0.0098 mV	Pass
500.000 mV	500.000 mV	499.850 mV	499.958 mV	500.150 mV	0.018 mV	Pass
600.000 mV	600.000 mV	599.825 mV	599.954 mV	600.175 mV	0.020 mV	Pass
1.90000 V	1.90000 V	1.89950 V	1.89991 V	1.90050 V	0.00006 V	Pass
2.30000 V	2.30000 V	2.29940 V	2.29989 V	2.30060 V	0.00008 V	Pass
5.00000 V	5.00000 V	4.99872 V	4.99970 V	5.00128 V	0.00017 V	Pass
6.00000 V	6.00000 V	5.99848 V	5.99958 V	6.00152 V	0.00026 V	Pass
19.00000 V	19.00000 V	18.99522 V	18.99883 V	19.00478 V	0.00058 V	Pass
23.00000 V	23.00000 V	22.99422 V	22.99842 V	23.00578 V	0.00071 V	Pass
50.0000 V	50.0000 V	49.9875 V	49.9972 V	50.0125 V	0.0017 V	Pass
60.0000 V	60.0000 V	59.9850 V	59.9964 V	60.0150 V	0.0022 V	Pass
190.0000 V	190.0000 V	189.9525 V	189.9879 V	190.0475 V	0.0061 V	Pass
-1.0000 mV	-1.0000 mV	-1.0252 mV	-1.0133 mV	-0.9748 mV	0.0069 mV	Pass
-1.9000 mV	-1.9000 mV	-1.9255 mV	-1.9086 mV	-1.8745 mV	0.0057 mV	Pass
-2.3000 mV	-2.3000 mV	-2.3256 mV	-2.3078 mV	-2.2744 mV	0.0072 mV	Pass
-5.0000 mV	-5.0000 mV	-5.0262 mV	-5.0066 mV	-4.9738 mV	0.0053 mV	Pass
-6.0000 mV	-6.0000 mV	-6.0265 mV	-6.0076 mV	-5.9735 mV	0.0054 mV	Pass
-19.0000 mV	-19.0000 mV	-19.0298 mV	-19.0057 mV	-18.9702 mV	0.0062 mV	Pass
-23.0000 mV	-23.0000 mV	-23.0308 mV	-23.0070 mV	-22.9692 mV	0.0055 mV	Pass
-50.0000 mV	-50.0000 mV	-50.0375 mV	-50.0040 mV	-49.9625 mV	0.0070 mV	Pass
-60.0000 mV	-60.0000 mV	-60.0400 mV	-60.0048 mV	-59.9600 mV	0.0068 mV	Pass
-190.0000 mV	-190.0000 mV	-190.0725 mV	-189.9984 mV	-189.9275 mV	0.0085 mV	Pass
-230.0000 mV	-230.0000 mV	-230.0825 mV	-229.9925 mV	-229.9175 mV	0.0098 mV	Pass
-500.000 mV	-500.000 mV	-500.150 mV	-499.976 mV	-499.850 mV	0.018 mV	Pass
-600.000 mV	-600.000 mV	-600.175 mV	-599.973 mV	-599.825 mV	0.020 mV	Pass
-1.90000 V	-1.90000 V	-1.90050 V	-1.89994 V	-1.89950 V	0.00006 V	Pass
-2.30000 V	-2.30000 V	-2.30060 V	-2.29988 V	-2.29940 V	0.00008 V	Pass
-5.00000 V	-5.00000 V	-5.00128 V	-4.99975 V	-4.99872 V	0.00017 V	Pass
-6.00000 V	-6.00000 V	-6.00152 V	-5.99953 V	-5.99848 V	0.00026 V	Pass
-19.00000 V	-19.00000 V	-19.00478 V	-18.99873 V	-18.99522 V	0.00058 V	Pass
-23.00000 V	-23.00000 V	-23.00578 V	-22.99888 V	-22.99422 V	0.00071 V	Pass
-50.0000 V	-50.0000 V	-50.0125 V	-49.9973 V	-49.9875 V	0.0017 V	Pass
-60.0000 V	-60.0000 V	-60.0150 V	-59.9975 V	-59.9850 V	0.0022 V	Pass
-190.0000 V	-190.0000 V	-190.0475 V	-189.9897 V	-189.9525 V	0.0061 V	Pass
Square Wave Accuracy						

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校准数据报告

CALIBRATION DATA REPORT

证书编号: TSS0058016-20240624-1
Certificate No.
数据类型: Found-Left
Data Type

校准项目 Step/Operation	标准值/标称值 STD Value/Nominal Value	容许下限 Lower Limit	测量值 Measured Value	容许上限 Upper Limit	扩展不确定度 *U* (*k*=2)	结果 Result
Square Pos 6 mV @ 1 kHz	6.00 mV	5.98 mV	6.00 mV	6.02 mV	0.01 mV	Pass
Square Pos 60 mV @ 1 kHz	60.000 mV	59.930 mV	60.031 mV	60.070 mV	0.017 mV	Pass
Square Pos 600 mV @ 1 kHz	600.00 mV	599.39 mV	600.04 mV	600.61 mV	0.12 mV	Pass
Square Pos 6 V @ 1 kHz	6.0000 V	5.9940 V	6.0002 V	6.0060 V	0.0012 V	Pass
Square Pos 60 V @ 1 kHz	60.000 V	59.940 V	59.998 V	60.060 V	0.021 V	Pass
Square Neg 6 mV @ 1 kHz	6.00 mV	5.98 mV	6.00 mV	6.02 mV	0.01 mV	Pass
Square Neg 60 mV @ 1 kHz	60.000 mV	59.930 mV	60.026 mV	60.070 mV	0.017 mV	Pass
Square Neg 600 mV @ 1 kHz	600.00 mV	599.39 mV	600.01 mV	600.61 mV	0.12 mV	Pass
Square Neg 6 V @ 1 kHz	6.0000 V	5.9940 V	5.9999 V	6.0060 V	0.0012 V	Pass
Square Neg 60 V @ 1 kHz	60.000 V	59.940 V	59.994 V	60.060 V	0.021 V	Pass
Square Sym 6 mV @ 1 kHz	6.00 mV	5.98 mV	6.00 mV	6.02 mV	0.01 mV	Pass
Square Sym 60 mV @ 1 kHz	60.000 mV	59.930 mV	60.033 mV	60.070 mV	0.017 mV	Pass
Square Sym 600 mV @ 1 kHz	600.00 mV	599.39 mV	600.06 mV	600.61 mV	0.12 mV	Pass
Square Sym 6 V @ 1 kHz	6.0000 V	5.9940 V	6.0004 V	6.0060 V	0.0012 V	Pass
Square Sym 60 V @ 1 kHz	60.000 V	59.940 V	60.000 V	60.060 V	0.021 V	Pass
LF Sine Wave Accuracy						
SIN 4.8V @ 1 kHz	4.800 V	4.632 V	4.797 V	4.968 V	0.017 V	Pass
SIN 4.8V @ 45 kHz	4.800 V	4.632 V	4.796 V	4.968 V	0.015 V	Pass
SIN 1.9V @ 1 kHz	1.9000 V	1.8335 V	1.8981 V	1.9665 V	0.0055 V	Pass
SIN 1.9V @ 45 kHz	1.9000 V	1.8335 V	1.8982 V	1.9665 V	0.0054 V	Pass
Time Markers Accuracy						
10 ns Time Marker Deviation	0.00000 ps	-0.00250 ps	0.00042 ps	0.00250 ps	0.00001 ps	Pass
100 ns Time Marker Deviation	0.00000 ps	-0.02500 ps	0.00420 ps	0.02500 ps	0.00013 ps	Pass
1 us Time Marker Deviation	0.0000 ps	-0.2500 ps	0.0520 ps	0.2500 ps	0.0013 ps	Pass
1 ms Time Marker Deviation	0.0000 ns	-0.2500 ns	0.0490 ns	0.2500 ns	0.0013 ns	Pass
10 ms Time Marker Deviation	0.000 ns	-2.500 ns	0.590 ns	2.500 ns	0.014 ns	Pass
Pulse Width Accuracy						
4.000 ns	4.000 ns	3.600 ns	3.617 ns	4.400 ns	0.062 ns	Pass
20.000 ns	20.000 ns	18.800 ns	19.950 ns	21.200 ns	0.065 ns	Pass
100.00 ns	100.00 ns	94.80 ns	100.53 ns	105.20 ns	0.13 ns	Pass
Load Resistance Accuracy						
50.000 Ω	50.000 Ω	49.950 Ω	50.006 Ω	50.050 Ω	0.023 Ω	Pass
1.0000 MΩ	1.0000 MΩ	0.9990 MΩ	0.9999 MΩ	1.0010 MΩ	0.0003 MΩ	Pass

符合性声明: 规则 1
The statement of conformity: Decision Rule 1

校准数据报告说明

Explanation of Calibration Data Report

证书编号: TSS0058016-20240624-1

Certificate No.

本报告中测量扩展不确定度符合《ISO测量不确定度表示指南(GUM)》，其置信因子(*k*) 为2，置信概率约为95%。

The measurement expanded uncertainties provided in the report compliy with The ISO Guide to the Expression of Uncertainty in Measurement (GUM). The coverage factor (*k*) is 2, with coverage probability of approximately 95%.

除特殊说明外，容许下限/容许上限是根据被校样品厂家说明书计算获得。

Except special explanation, Lower Limit/Upper Limit are calculated according to UUT's manufacturer specification manual.

数据类型：

The data types:

As Found: 调整和/或维修前的校准数据报告。

As Found: Calibration data collected before the unit is adjusted and/or repaired.

As Left: 调整和/或维修后的校准数据报告。

As Left: Calibration data collected after the unit has been adjusted and /or repaired.

Found-Left: 没有实施调整和/或维修的校准数据报告。

Found-Left: Calibration data collected without any adjustment and/or repair performed.

被校样品的“接收情况”与“校准结果”和“数据类型”有关。

The device-under-test overall “Received Conditions” is determined on "Calibration Result" and " Data Type".

判定规则和符合性声明：

The decision rules and statements of conformity:

规则0(DR0): 校准数据报告中无符合性判断，但包含测量值和对应测量结果的扩展不确定度。

Decision Rule 0(DR0): The Calibration Data Report doesn't provide the statement of conformity, but it includes Measured Value with the Expanded Measurement Uncertainty.

规则1(DR1): 简单的二元接受，校准数据报告中有符合性判断，且包含测量结果的扩展不确定度。接受限等同于容许限，如 CNAS-GL015:2022 附录B示例1所示。测试不确定度比(TUR)应尽可能大于4:1，且不小于1:1。

Decision Rule 1(DR1): Binary simple acceptance rule. The Calibration Data Report provide the statement of conformity, also includes Measured Value with the Expanded Measurement Uncertainty. Acceptance limit is equal to tolerance limit, as showed in CNAS-GL015:2022 APPENDIX B, Example 1.The test uncertainty ratio (TUR) shall be greater than 4:1 whenever attainable, although never less than 1:1.

规则2(DR2): 基于保护带的二元接受，校准数据报告中有符合性判断，且包含测量结果的扩展不确定度。接受限(*AL*)由公式 $AL=\sqrt{(TL^2-U^2)}$(均方根)计算获得,*TL*是校准点的容许限，*U*是测量结果的扩展不确定度，如CNAS-GL015:2022 附录B示例3所示。测试不确定度比(TUR)应尽可能大于4:1，且不小于1:1。

Decision Rule 2(DR2): Binary acceptance rule based on guard band. The Calibration Data Report provide the statement of conformity, also include Measured Value with the Expanded Measurement Uncertainty. Acceptance limit is given by $AL=\sqrt{(TL^2-U^2)}$(Root-Differene-Square), *TL* is tolerance limit of calibration point and *U* is the expanded measurement uncertainty,as showed in CNAS-GL015:2022 APPENDIX B, Example 3. The test uncertainty ratio (TUR) shall be greater than 4:1 whenever attainable, although never less than 1:1.

规则3(DR3): 基于保护带*w=U*的非二元接受，校准数据报告中有符合性判断，且包含测量结果的扩展不确定度。接受区间是容许区间的一部分，接受限等于容许限减去保护带，保护带等于测量结果的扩展不确定度，如CNAS-GL015:2022 附录B示例2所示。测试不确定度比(TUR)应尽可能大于4:1，且不小于1:1。

Decision Rule 3(DR3): Non-binary acceptance rule based on guard band *w=U*. The Calibration Data Report provide the statement of conformity, also includes Measured Value with the Expanded Measurement Uncertainty. Acceptance Interval is part of tolerance Interval, the upper acceptance limit is upper tolerance limit minus guard band, the lower acceptance limit is lower tolerance limit minus guard band, as showed in CNAS-GL015:2022 APPENDIX B, Example 2.The test uncertainty ratio (TUR) shall be greater than 4:1 whenever attainable, although never less than 1:1.

校准数据报告可能包含超出认可能力范围或测试不确定度比(TUR)小于1:1的校准。如果有，这些校准被“#”标注。

The Calibration Data Report may contain measurements that are not covered by the Scope of Accreditation or test uncertainty ratio less than 1:1. These measurements are indicated by a pound sign(#).

校准数据报告结束

Calibration Data Report Complete