Hioki DT4282 Review

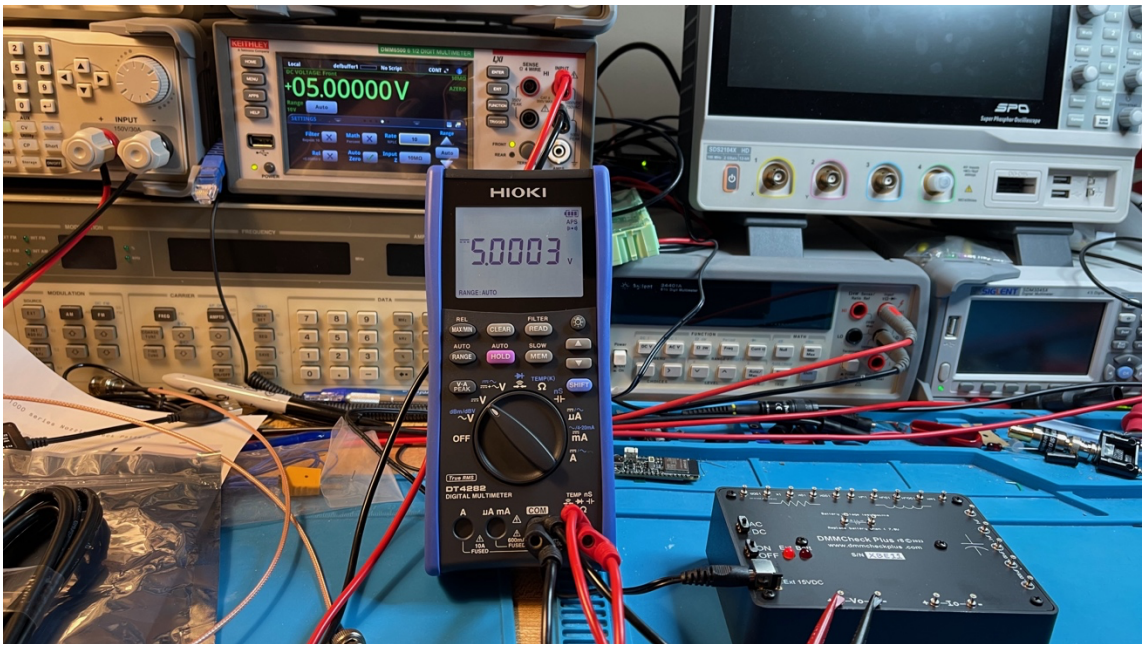
Introduction

Hi, I am Tom, amateur radio call sigh N8FDY. This is a review of the Hioki DT4282 multimeter for use in hobby electronics projects primarily related to amateur radio.

Disclaimer

I am not a professional, I am a hobbyist. This review is not sponsored; I bought this multimeter with my own money. I only used and tested this multimeter in CAT I and CAT II environments. I do not have a way to review or test the safety of this meter. I leave the CAT III and CAT IV environments to trained and licensed professionals. It may seem like I am a Fluke fan boy, but I recognize their flaws along with their advantages. There may be unintended mistakes and/or errors in this review.

Overview



I am testing and demonstrating this Hioki DT4282 multimeter that I purchased from Amazon for $369.51 on March 2024 supplied by the YOKOHAMA store, it is in India, so I believe this is a gray market import. If you are in the US, I recommend you buy it from hiokiusastore.com for $574.00 if you want support. I only used it in CAT I and CAT II environments.

CAT I is for measurements on circuits not directly connected to mains. For example, battery-operated electronics, or radio gear connected to a 13V DC power supply.

CAT II is for measurements performed on circuits directly connected to 120V (240V in some countries) power outlets at least 30 feet from the distribution panel. For example, your 120V AC to 13V DC power supply or a vintage piece of ham radio gear we lovingly call “boat anchors” that plug into a 120V AC outlet.

First, we will look at the features of the multimeter, then we will look at the accuracy of the meter. We will then go over the ergonomics. We will wrap up with the pros, cons and conclusion.

I will not be using the test leads that came with the meter. I have not liked any test leads that came with multimeters except the Fluke TL175 TwistGuard® test leads that were bundled with the Fluke 87V MAX. I also use Probe Master Series 8000 Test Leads.

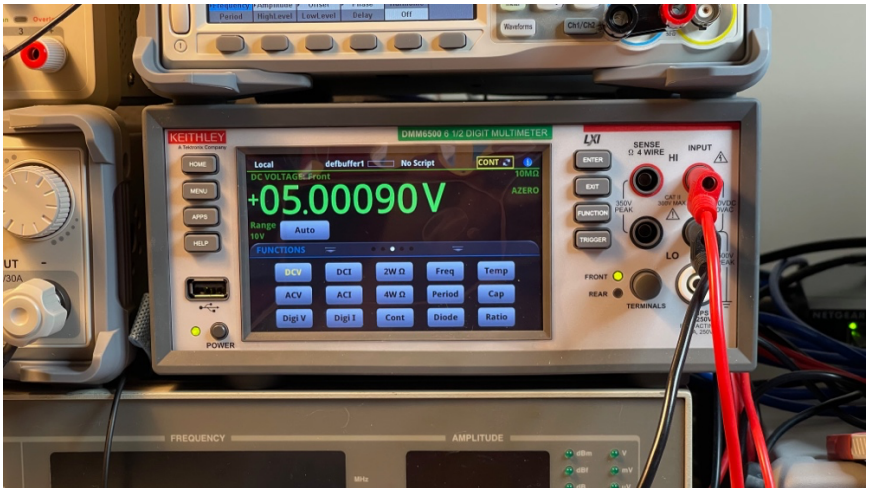
Objectives

This review was produced to help you decide if the Hioki DT4282 multimeter will fit your purpose and budget. This is part of a series of multimeters reviews.
A good multimeter for hobby electronics projects should be able to measure millivolts, volts, microamps, milliamps, amps, ohms, nanofarads and microfarads.
If you want to measure picofarads, nanohenrys, microhenrys or reactance you will need an LCR meter. I cover the two LCR meters I own in another review.

Features

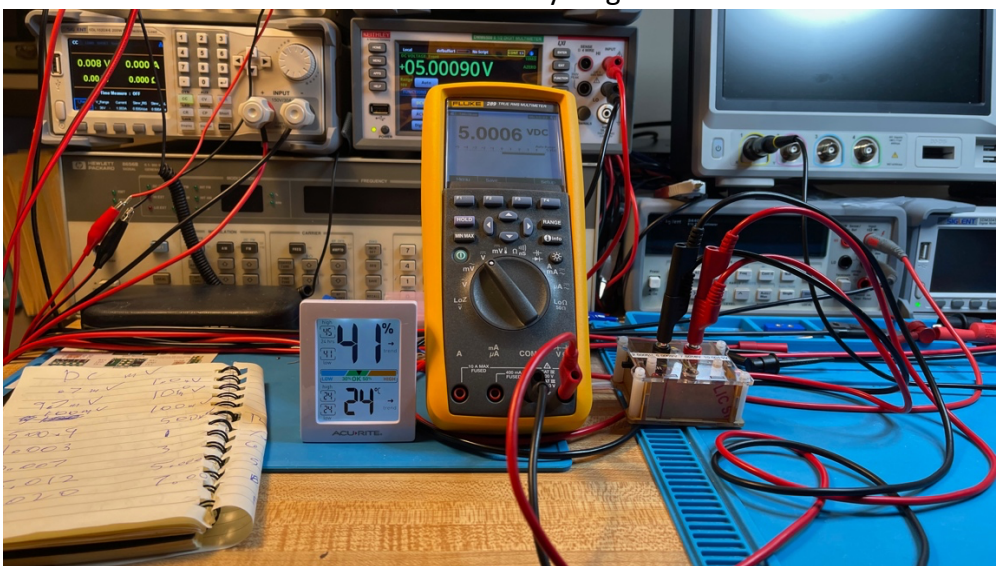
- 60,000 count, 5-digit display.
- Basic DC accuracy 0.025% ± 5.
- True RMS.
- 20 Hz to 100 kHz AC V frequency response.
- Low-pass filter.
- Includes terminal shutter mechanism for accident prevention (prevents erroneous test lead insertion).
- CATIII 1000V, CATIV 600V.
- Store 400 point of data locally.
- Hold and Auto Hold.
- Slow (smoothing) function.
- Min/Max.
- Volts and Amps Peak.
- Rel or Delta.
- USB communications function supports PC measurements (optional $115.00).
- From -5°F to 131°F operating temperature range.
- 3-year warranty.

Accuracy



I do not have reference standards. Instead, I use a Keithley DMM6500 6.5 digit bench multimeter that was calibrated recently to measure voltages, currents, resistances and capacitances. I take a reading from the

Keithley and based on the Keithley stated tolerance for that range and reading, I compute the lowest and highest value the reading could be, then I use the meter under test to take a reading. I calculate the meter-under-test reading uncertainty value and subtract it from the lowest value and add it to the highest value. If the reading is within the range of the lower and higher limits, it meets meter-under-test accuracy specification.
For example, I have a voltage source that is 5 V. I take a reading with the Keithley and I get a value of 5.00090 and based on the Keithley specifications for that range ±(0.0025% of reading + 0.0005% of range); that value could be anywhere from 5.00072 to 5.00108. I then use the meter-under-test (for this example my Fluke 289, my most accurate hand-help meter) reading of 5.0006. The Fluke 289's accuracy at this range is ±(0.025% of reading + 2 least significant digits) for an uncertainty value of 0.00145015 volts. So, subtracting this from the lowest value the Keithley reading gives us 4.99927V for the low value limit and adding to the highest value, the Keithley gives us 5.00253V for the high value limit. The meter-under-test reading (5.0006) is within the limits, so the meter-under-test meets its accuracy target for 5 volts.



DC Volts

Source	Reading	Specification	Uncertainty	Low Bound	High Bound
mV					
1.0296	1.034	0.2%±25	0.0271	1.002	1.057
5.0151	5.021	0.2%±25	0.0350	4.980	5.051
9.9999	10.005	0.2%±25	0.0450	9.954	10.046
25.0315	25.037	0.2%±25	0.0751	24.955	25.108
50.0251	50.031	0.2%±25	0.1251	49.898	50.152
100.0120	100.01	0.025%±5	0.0750	99.93	100.09
250.014	250.02	0.025%±5	0.1125	249.89	250.14
500.025	500.05	0.025%±5	0.1750	499.8315	500.2185
V					
0.500023	0.50005	0.025%±2	0.000325	0.4996	0.5004
1.000012	1.0000	0.025%±2	0.000450	0.9995	1.0005
1.50003	1.5000	0.025%±2	0.000575	1.4994	1.5007
2.00003	2.0001	0.025%±2	0.000700	1.9992	2.0008
2.49978	2.4998	0.025%±2	0.000825	2.4988	2.5007
3.00066	3.0008	0.025%±2	0.000950	2.9996	3.0017
4.00077	4.0009	0.025%±2	0.001200	3.9994	4.0021
5.00092	5.0011	0.025%±2	0.001450	4.9993	5.0025
5.99997	6.000	0.025%±2	0.003500	5.996	6.004
6.99999	7.000	0.025%±2	0.0037500	6.996	7.004
7.50163	7.502	0.025%±2	0.0038755	7.498	7.506
8.00031	8.000	0.025%±2	0.0040000	7.996	8.005
9.00022	9.000	0.025%±2	0.0042500	8.996	9.005
10.00157	10.002	0.025%±2	0.0045005	9.997	10.006
15.0009	15.001	0.025%±2	0.0057503	14.994	15.008
30.0010	30.002	0.025%±2	0.0095005	29.990	30.012
51.7921	51.79	0.025%±2	0.0149475	51.77	51.81
101.8768	101.87	0.03%±2	0.03	101.84	101.91
199.445	199.47	0.03%±2	0.05	199.38	199.51
292.907	292.89	0.03%±2	0.08	292.81	293.00
397.968	397.97	0.03%±2	0.10	397.84	398.09
499.270	499.29	0.03%±2	0.13	499.11	499.43
629.25	629.3	0.03%±2	0.2	629.1	629.4

The meter met its accuracy specifications for all the DC voltages I tested.

VDC Input	11 MΩ
mVDC input	1 GΩ

VDC input has over 10 MΩ resistance, which is good, so the meter is less likely to load down a high impedance circuit when checking voltage. The mVDC input was too high to measure on any of my meters. The manual states that it is "1GΩ or more", I have no reason to doubt Hioki. 1GΩ is very good for the mV range.

AC Volts

Source	Reading	Specification	Uncertainty	Low Bound	High Bound
Volts 100Hz Squarewave					
4.99922	5.0006	0.6%±40	0.0340	4.9592	5.0392
60 Hz Sinewave					
mV					
1.0082	0.975	0.4%±40	0.0439	0.964	1.053
5.0154	5.014	0.4%±40	0.0601	4.952	5.078
9.9983	9.998	0.4%±40	0.0800	9.912	10.084
24.9970	25.009	0.4%±40	0.1400	24.842	25.152
50.1013	50.108	0.4%±40	0.2404	49.831	50.372
100.0786	100.03	0.4%±40	0.8001	99.22	100.94
250.540	250.59	0.4%±40	1.4024	248.99	252.09
501.000	501.08	0.4%±40	2.4043	498.29	503.71
Volts					
0.501052	0.50116	0.2%±25	0.0013	0.49920	0.50290
0.999997	0.9996	0.2%±25	0.0045	0.9946	1.0054
2.00321	2.0038	0.2%±25	0.0065	1.9925	2.0139
3.00851	3.0095	0.2%±25	0.0085	2.9952	3.0218
4.01211	4.0130	0.2%±25	0.0105	3.9962	4.0280
5.00077	5.0018	0.2%±25	0.0125	4.9823	5.0193
6.00142	5.996	0.2%±25	0.0370	5.958	6.045
7.00219	6.997	0.2%±25	0.0390	6.956	7.048
10.08371	10.080	0.2%±25	0.0452	10.029	10.138
20.1287	20.135	0.2%±25	0.0653	20.048	20.209
25.0347	25.045	0.2%±25	0.0751	24.942	25.128
50.1565	50.165	0.2%±25	0.1253	49.998	50.315
75.0401	75.04	0.2%±25	0.1751	74.82	75.26
100.0272	100.02	0.2%±25	0.2250	99.74	100.32
140.0776	140.08	0.2%±25	0.3052	139.69	140.47

The meter met its accuracy specifications for all the AC voltages that I tested.

ACV 1V 3dB cutoff	900 kHz

The frequency of the cutoff is very good for audio and IF work.

AC+DC

This meter has an AC+DC measurement mode.
The formula for measuring True-RMS with AC and DC components:

$$Vrms = \sqrt{\mathrm{Vac}^2 + \mathrm{Vdc}^2}$$

A meter with AC+DC calculates this for you.

Source	Reading	Specification	Uncertainty	Low Bound	High Bound
AC+DC					
4.469941	4.4698	0.3%±30	0.0164094	4.4515	4.4884
4.459366	4.4612	0.3%±30	0.0163836	4.4381	4.4806
3.156244	3.1579	0.3%±30	0.0124737	3.1392	3.1733
4.176973	4.1776	0.3%±30	0.0155328	4.1584	4.1956

The meter met its accuracy specifications for all the AC+DC values I tested.

dBm

This meter can measure dBm (decibel-milliwatts) using a selected impedance values of 4, 8, 16, 32, 50, 75, 93, 110, 125, 135, 150, 200, 250, 300, 500, 600, 800, 900, 1000, or 1200 ohms.

Typical 600 reference impedance ranges: -48 dB to +62 dB

Current

Source	Reading	Specification	Uncertainty	Low Bound	High Bound
AC 100Hz mA Squarewave					
1.000254	1.002	0.6%±20	0.0260	0.9728	1.0277
DC µA					
0.89589	0.90	0.05%±5	0.0504500	0.84	0.95
9.21812	9.22	0.05%±5	0.0546100	9.16	9.28
99.0199	99.02	0.05%±5	0.0995100	98.87	99.17
131.881	131.89	0.05%±5	0.1159450	131.71	132.06
DC mA					
1.009203	1.010	0.05%±5	0.0055050	1.003	1.015
9.99466	9.996	0.05%±5	0.0099980	9.982	10.007
99.4280	99.42	0.15%±5	0.0997100	99.30	99.55
100.3031	100.32	0.15%±5	0.1001600	100.18	100.43
250.649	250.63	0.15%±5	0.1753150	250.37	250.92
DC Amps					
1.000963	1.0011	0.2%±5	0.0025022	0.9980	1.0039
2.000269	2.0005	0.2%±5	0.0045010	1.9946	2.0059
3.000123	3.0007	0.2%±5	0.0065014	2.9920	3.0082

The meter met its accuracy specifications for all the current values I tested.

A Shunt Resistance	0.027 Ω
mA Shunt Resistance	2.17 Ω
µA Shunt Resistance	102.20 Ω

It is always good to know how much resistance you are adding to your circuit when you make current measurements.

Resistance

Source	Reading	Specification	Uncertainty	Low Bound	High Bound
Ohms					
1.018	1.035	0.3%±20	0.0231	0.995	1.041
10.029	10.025	0.3%±20	0.0501	9.978	10.080
100.095	100.03	0.03%±2	0.0500	100.03	100.16
kΩ					
1.00026	1.0005	0.03%±2	0.0005	0.9997	1.0008
10.0024	10.001	0.03%±2	0.0023	9.999	10.006
100.059	100.05	0.03%±2	0.0500	100.00	100.12
MΩ					
0.99447	0.9942	0.15%±4	0.0019	0.9925	0.9965
9.98	9.97	1.5%±10	0.2496	9.73	10.23
99.96	99.6	3%±20	4.9880	94.8	105.2

The meter met its accuracy specifications for all the resistance values I tested.

Resistance Test Voltage	
Low Range	2.07 V
Medium Range	1.36 V
High Range	0.47 V

Capacitance

Source	Reading	Specification	Uncertainty	Low Bound	High Bound
nF					
1.0027	1.000	1%±20	0.0300	0.960	1.046
9.934	9.94	1%±20	0.1494	9.73	10.13
99.44	99.5	1%±20	1.4950	97.4	101.4
µF					
1.0079	1.008	1%±20	0.0301	0.973	1.043
10.823	10.9	2%±20	0.7180	10.1	11.6
113.15	109	2%±20	7.1800	105	121
1005.5	988	2%±20	24.7600	975	1036

The meter met its accuracy specifications for all the capacitance values I tested.

Diode

Max Diode Voltage	4.41 V
Max Diode Current	0.968 mA

The meter has an adjustable beep threshold, you can choose from 0.15V, .5V, 1V, 1.5V, 2V, 2.5V, 3V. The default is 0.5V, any forward voltage at or below the voltage causes a beep with red backlight. The meter lit the LEDs I tested. The Schottky, Small Signal and Power diodes measured correctly.
Note: the beep does not work like the chirp (short beep) functions on other meters.

Continuity

The continuity threshold is adjustable on this meter, you can set the value from 20Ω short, 220Ω open; 50 Ω short, 250Ω open; 100Ω short, 300Ω open; or 500 Ω short, 600 Ω open. The default is 20Ω short, 220Ω open. It is fast and latches, the backlight also flashes.

Test Leads

The test leads were a semi-soft type with gold plated tips. The meter also came with a thermocouple for measuring temperature. I did not test temperature measurements.

Ergonomics

The rotary switch is easy to turn and firmly clicks into place. It has a unique shutter that closes the jacks that should not be used when the dial is in a particular position. For example, when a test lead is plunged in to the V-Ω-etc. jack you cannot move the rotary dial to any of the amp positions.
It has a large display with medium numbers to make room for the double display. The backlight is bright and evenly lit except for two very slight hotspots at the top of the screen.
Power On Modifiers:

Button	Action	Permanence
HOLD	Disable auto power save	Until next power on
MIN/MAX	Buzzer Mute Toggle	Until changed
Backlight	Toggles between 40 seconds backlight off / 3 minutes backlight off if no activity	Until changed
CLEAR	Clear all memory data	Press CLEAR again within 3 seconds
CLEAR and SHIFT	System reset	Press CLEAR again within 3 seconds
DOWN	dBm impedance set mode	About 3 seconds
UP	Toggle 4-20 mA/0-20 mA	Until changed
V-A PEAK	Show all screen segments	On during button press
RANGE	Show software version	On during button press
MIN/MAX and UP	Toggle temperature unit	Until changed
READ	Displaying the serial number	On during button press
SHIFT	Toggle DC voltage alarm for -10VDC or less	Until changed

Accuracy Specifications Within the Group of Top 6 50,000 to 60,000 Count Meters

Value	EEVblog 121GW	Greenlee DM-860A	Uni-T UT181A	HIOKI DT4282	Fluke 189	Fluke 289FVF
Cost	$225.00	$346.44	$400.99	$574.00	$650.00	$876.59
Count	50,000	50,000	60,000	60,000	50,000	50,000
DC mV Low	0.1%±10	0.02%±2	0.025%±20	0.2%±25	0.1%±20	0.05%±20
DC mV High	0.1%±10	0.02%±2	0.025%±5	0.025%±5	0.03%±2	0.025%±2
DC V Low	0.05%±5	0.02%±2	0.025%±5	0.025%±2	0.025%±10	0.025%±2
DC V High	0.1%±10	0.04%±2	0.03%±5	0.03%±2	0.1%±2	0.03%±2
AC mV	0.8%±10	0.3%±20	0.3%±30	0.4%±40	0.4%±40	0.3%±25
AC V	0.3%±10	0.3%±30	0.3%±30	0.2%±25	0.4%±40	0.3%±25
AC V ± DC V	1.0% ± 10	0.5% ± 80	1% ± 80	0.3%±30	0.5%±40	0.5% ± 80
DC µA	1.5%±15	0.15%±20	0.08%±20	0.05%±5	0.25%±20	0.075%±20
DC mA	0.75%±15	0.15%±30	0.15%±10	0.15%±5	0.15%±2	0.15%±2
DC A	0.75%±15	0.5%±20	0.5%±10	0.2%±5	0.5 %±10	0.3%±10
AC µA	2.0%±20	0.5%±50	0.6%±40	0.6%±20	0.75%±20	0.6%±20
AC mA	1.5%±15	0.5%±50	0.6%±20	0.6%±5	0.75%±5	0.6%±5
AC A	1.5%±15	0.5%±50	1%±20	0.8%±20	1.5%±20	0.8%±20
Ω	0.3%±5	0.07%±10	0.05%±10	0.03%±10	0.05%±10	0.05%±10
Low kΩ	0.2%±5	0.07%±2	0.05%±2	0.03%±2	0.05%±2	0.05%±2
High kΩ	0.2%±5	0.1%±2	0.05%±2	0.03%±2	0.05%±2	0.05%±15
Low MΩ	0.3%±5	0.3%±6	0.3%±10	±0.15%±4	0.15%±4	0.15%±4
High MΩ	1.2%±20	2%±6	2%±10	3.0%±20	3.0%±2	3.0%±2
Low nF	2.5%±5	0.8%±3	3%±10	1%±20	2%±5	1%±5
High nF	2.5%±5	0.8%±3	2%±5	1%±5	1%±5	1%±5
Low µF	2.5%±5	1.5%±3	2%±5	1%±5	1%±5	1%±5
High µF	3.0%±5	3.5%±5	2%±5	1%±5	1%±5	1%±5

The accuracy specifications are from the meters' respective manuals. The background color code shows the extreme low and high accuracy specifications. Green is the highest, yellow is lowest, and white is everything in-between. The Hioki takes the lead with 11 best specifications, followed closely by Greenlee DM-860A (rebranded Brymen 869s) with 9, runner up is Fluke 289 with 5 and Fluke 189 with 4, and the trailing edge taken by the 121GW with 1 and Uni-T 181A with 0 each. It should be noted that the Fluke 289 is the only meter that did not have any specifications that were lowest in the group.

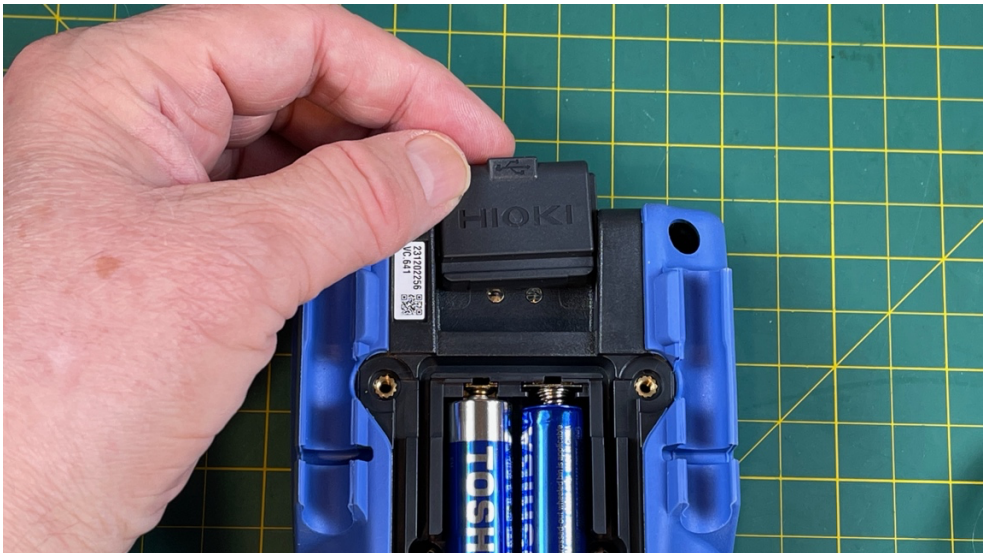
Accuracy Specifications Comparison of the Fluke 289 and Hioki DT4282

Value	HIOKI DT4282	Fluke 289FVF
Cost	$574.00	$876.59
Count	60,000	50,000
DC mV Low	0.2%±25	0.05%±20
DC mV High	0.025%±5	0.025%±2
DC V Low	0.025%±2	0.025%±2
DC V High	0.03%±2	0.03%±2
AC mV	0.4%±40	0.3%±25
AC V	0.2%±25	0.3%±25
AC V ± DC V	0.3%±30	0.5% ± 80
DC µA	0.05%±5	0.075%±20
DC mA	0.15%±5	0.15%±2
DC A	0.2%±5	0.3%±10
AC µA	0.6%±20	0.6%±20
AC mA	0.6%±5	0.6%±5
AC A	0.8%±20	0.8%±20
Ω	0.03%±10	0.05%±10
Low kΩ	0.03%±2	0.05%±2
High kΩ	0.03%±2	0.05%±15
Low MΩ	±0.15%±4	0.15%±4
High MΩ	3.0%±20	3.0%±2
Low nF	1%±20	1%±5
High nF	1%±5	1%±5
Low µF	1%±5	1%±5
High µF	1%±5	1%±5

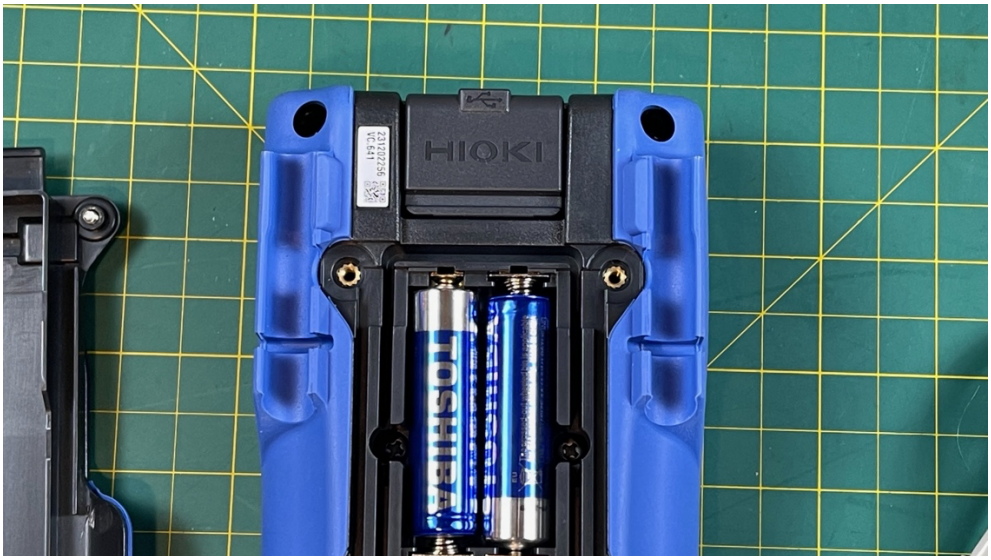
The accuracy specifications are from the meters' respective manuals. The background color code shows the extreme low and high accuracy specifications. Green is the highest, yellow is lowest, and white is everything in-between. Very close, The Fluke 289 has the edge for DC millivolts, AC millivolts, DC milliamps and Low nF, but the Hioki DT4282 has the edge for AC Volts and AC+DC Volts, DC microamps, DC amps, ohms and kilohms.

PC Connection (optional)

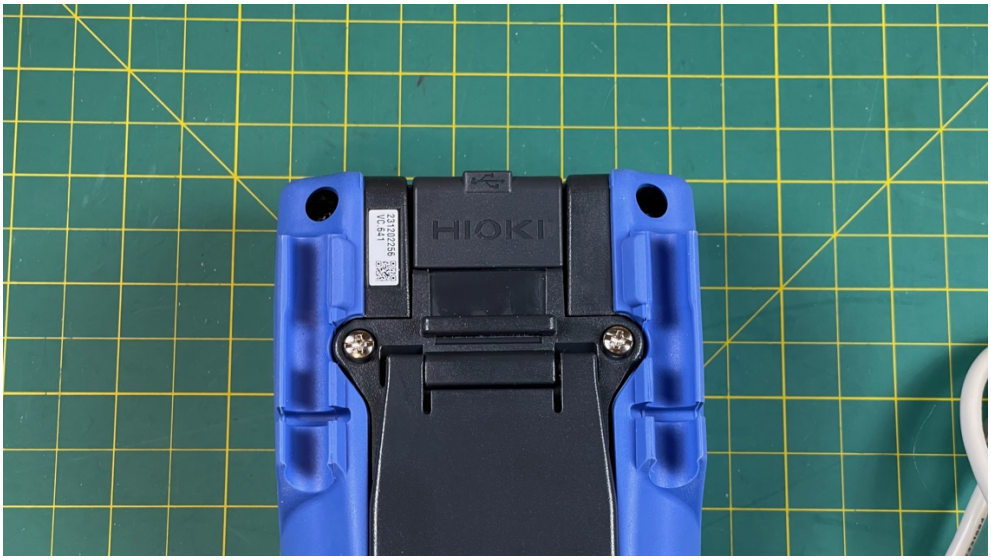
USB Interface (DT4900-01) with separate cable. $115 from Tequipment.com.



Remove back cover and insert interface module.



Interface module seated.

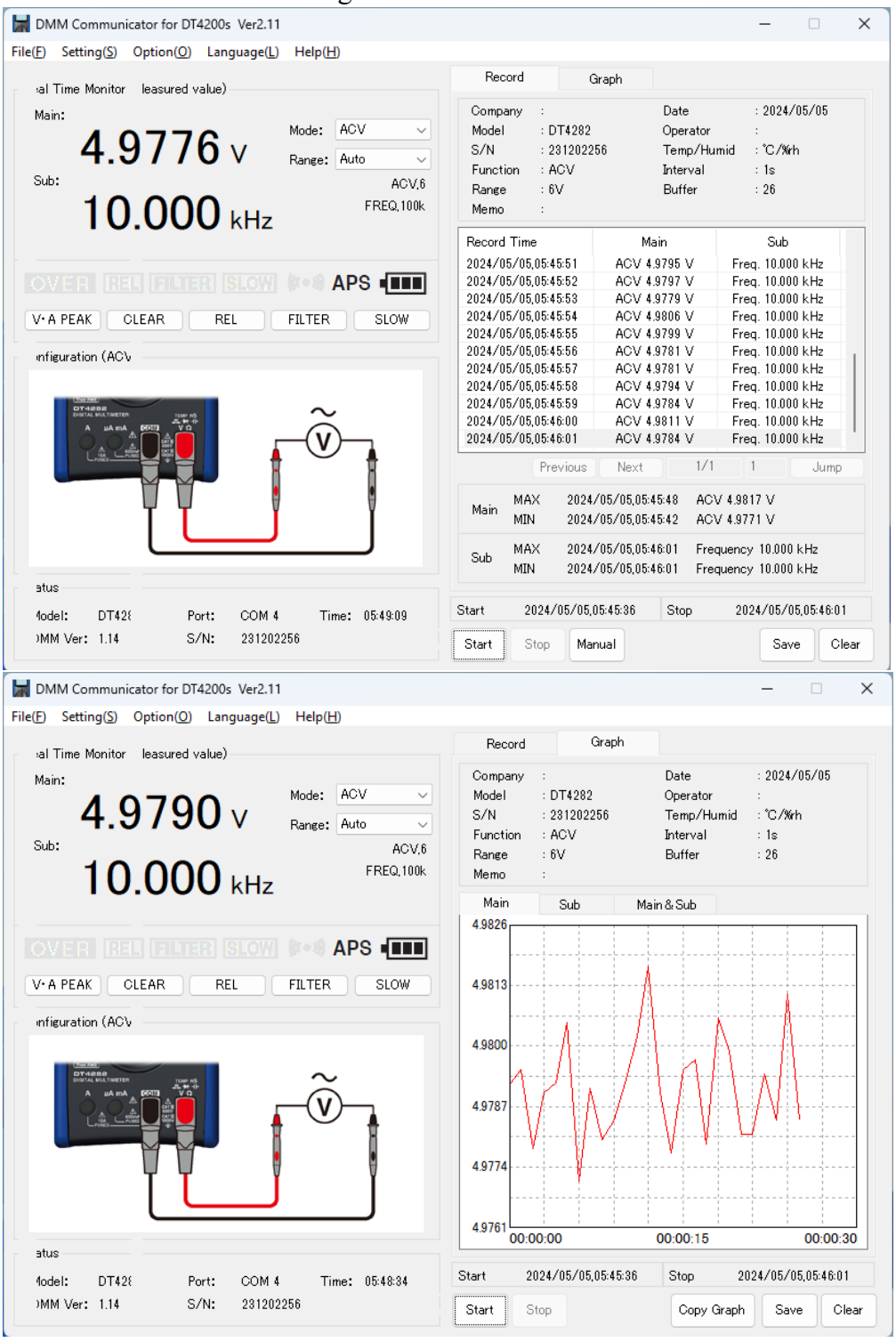


Reinstall back cover to lock in interface module.

Top of meter now has the USB connecter.

PC Software

I was able to download the updated (9-July-2021) software from the Hioki web site: https://www.hioki.com/us-en/support/download/software/versionup/detail/id_235. Note that PC software from Fluke was last updated in 2016, and from Greenlee was last updated in 2016, and from EEVBlog was last updated in 2018 and from Uni-T was last updated in 2022.
I was able to run it on Windows 11 running on an AMD x64 processor. I was also able to run it in a virtual Windows 10 environment on an Intel base iMac. When the software was run in a virtual Windows 11 ARM environment it could not recognize the meters USB interface even after installing the updated drivers.



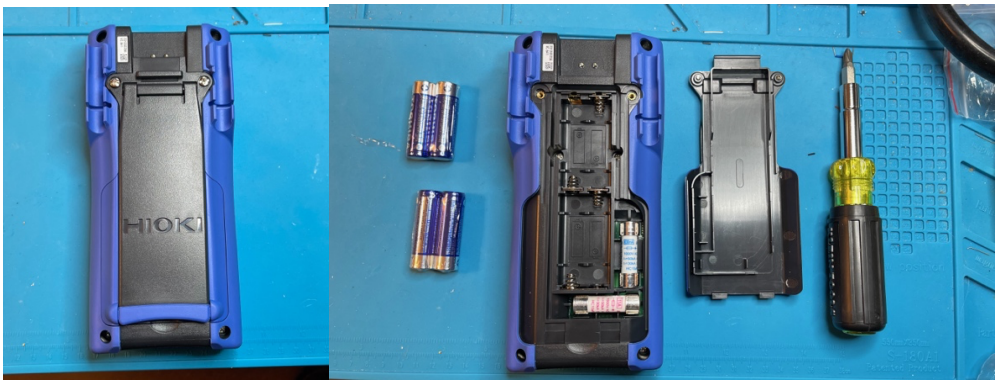
Screenshot of the software running on a Windows 11 AMD x64 PC

Case (Optional)

This is the nicest OEM meter case I have purchased. It is from Tequipment.com for $41.

Battery

The meter uses four AA batteries accessible from the back by removing the battery door. The battery door has two screws into brass inserts.



Fuses

The fuses are accessible from the battery compartment.

The manual states the fuses are:
Manufacturer: HOLLYLAND
Breaking characteristic: Fast-blow type
Breaking capacity: 50 kA AC/30 kA DC Size: φ10.3 mm × 38 mm
For µA/mA terminal: 630 mA/ 1000 V
For A terminal: 11 A/ 1000 V

Pros

- Met all accuracy specifications for all measurements taken.
- Leader in accuracy specifications in more categories than any other meter in this group.
- Dual Display with bright backlight.
- Adjustable continuity threshold.
- Adjustable diode forward voltage beep threshold.
- DC microvolts has a 1 GΩ input impedance.
- Well written and informative paper manual included and as a downloadable PDF.
- Optical to USB interface securely held in place and comes with replaceable cable.
- Fuses accessible from battery compartment.
- Optional PC Software update in 9-July-2021 is more recent than Fluke's, Greenlee's or EEVBlog's.

Cons

- Not third-party safety tested.
- Lowest accuracy specification in the group for low DC millivolts and high megaohm ranges.
- No analog bar graph.
- No different beep sound for diode short verses diode at or below set forward voltage threshold.
- PC Interface an extra cost option ($115).
- No Bluetooth interfaces.

Conclusion

I initially resisted buying and testing this meter because it was not third-party safety tested and it cost $574.00, and a cursory look made it seem like a Bryman 869s. After a few viewers, at least four, commented "Look at

the Hioki" I decided to download the manual and give it a read. The manual seemed well written, to the point, but complete. Then I saw the Hioki DT4282 at Amazon for $369.51 in March 2024, it was at the YOKOHAMA store. I investigated them, and it is a company in India. Many companies sell lower cost version of their products in the Indian market. I am guessing this company buys the meters in India then ships them to Amazon for sale in the US. There is no mention of support or warrantee on the Amazon product page or the YOKOHAMA store page. So, I am guessing it is a gray market product. I then decided to save $200 and take a gamble that the meter was exactly what is sold by the official US store, I don't recommend that you do that, but I was lucky, and the meter works fine. And I still had the Amazon 30-day return option. If the meter breaks in the future, I still have plenty of other meters to use.

I was impressed with this meter. With the Keysight meter I review recently, I had high expectation and was disappointed, but with the Hioki I had low expectations but was pleasantly surprised. Of the top 6 50,000 to 60,000 count meters, **I rate the Hioki DT4282 number one**. The only reservation is that it is not third-party safety tested. But in my final round of meter reviews, they are all non-third-party safety tested so I am not holding this against the meters.

I have not found the perfect meter yet, but this one is very close. If Hioki would update it to eliminate the cons listed above, I think it would be the perfect meter for me. I like the rotary dial layout; I like the button layout and I like the useful customization option. I also like the optional USB interface and software. I even like the optional OEM case.

I am keeping this meter and I selling off two of the other 50,000 to 60,000 count meters.

If you need a third-party safety tested meter, investigate these meters.

Meter	Count	Basic DC Accuracy	Price
Fluke 289	50,000	0.025%+2	$744.25
Uni-T UT181A	60,000	0.025%+5	$400.99
Greenlee DM-860A	50,000	0.02%+2	$368.63
EEVblog 121GW	50,000	0.05%+5	$225.00
Brymen BM869s	50,000	0.02%+2	$206.60
Brymen BM789	60,000	0.03%+2	$171.62
EEVblog Brymen BM786	60,000	0.03%+2	$154.11