cal equipment

A34401-3458G

Manufacturer	AGILENT	Calibration date	October 13 2018
Model Number	34401A	Ambient Temperature	22.94 °C
Serial	US36111998	Relative Humidity	64.12 %
ID Number	Erik-34401A	Pressure	1014.73
Notes	Check	Test type	HLK5720

This note is test dummy text block for further use. It allow to include user information for further reference

Reference standard	Mfg	Model	Options	Serial / Unc	CEID	Calibration date	Due date
MFC	HULK	5720A	03/HLK	E2E6	XC01	08/01/2018	09/01/2018
DMM	HP	3458A	001,X02	X	XD3	07/25/2018	01/25/2019
DC STD	xDevs.com	792X[2]	9.9999854 VDC	±2.2 ppm	XD01	02/16/2018	08/16/2018
Divider	Keithley	262	None	0000	XZ02	08/01/2018	08/01/2019

MFC last calibrated	0.0 days ago	MFC since DCV ZERO	0.0 days ago
MFC since WBFLAT	38.0 days ago	MFC since WBGAIN	39.0 days ago
MFC Confidence level	**24h 95% REL**	MFC Calibrate date	2018-10-13 00:00:00
MFC Calibrate date Zero	2018-10-13 00:00:00	Calibrate date WB Flatness	2018-09-05 00:00:00
Calibrate date WB Gain	2018-09-04 00:00:00	CAL CONST 6.5V reference voltage	6.95748344568
CAL CONST 13V reference voltage	13.8552984536	CAL CONST 22V range positive zero	398.17901
CAL CONST 22V range negative zero	398.17844	CAL CONST DAC Linearity	0.218906384464
CAL CONST 10KOHM true output resistance	9999.79135656	CAL CONST 10KOHM standard resistance	9998.59188314
CAL CONST, Zero calibration temperature	23.0	CAL CONST, All calibration temp	23.0

This note is test MFC dummy text block for further use.
Calibrator was warmed up >8 hours.

Meter Info	HEWLETT-PACKARD,34401A,0,10-5-2	Test date start	13 October 2018 12:38
Test specification interval	**24 hour DUT spec**	Self-test result?	-113,"Undefined header"
Line frequency	110V 60 Hz	Next calibration date	6
Last calibration date	6	SCPI Version	-113,"Undefined header"
Last calibration temperature	26.6	Calibration count	35.0

Service information

Calibration count
35.0
Calibration string
"21 JUN 2000 26.6C"
Reference
Guarded test
DUT Condition
test

Test procedure : $Id: hp34401a.py | Rev 997 | 2018/10/13 12:16:20 clu $

Source procedure : $Id: f5720g.py | Rev 997 | 2018/10/13 12:16:20 clu $

Main DC Voltage ranges performance test.
Checks zero offset and +/-FS calibration on all ranges
The following test for the offset voltage specification using MFC 0V source in 4-wire ext sense mode as reference.
DCV gain range points verify gain of the DC voltage function, using uncorrected 24-hour MFC output. DC voltage offset of DUT is nulled before FS tests.

Test Description	Expected Value	Measured Value	Measurement Uncertainty	Lower Limit	Upper Limit	Deviation	DUT Spec	Test Status
Short 0 mVDC	0.0000000E+00	**-0.53 µV**	8.23 µV	-11.230 µV	11.230 µV	N/A	3.00 µV	PASS
Short 0.0 VDC	0.0000000E+00	**-0.89 µV**	3.95 µV	-9.950 µV	9.950 µV	N/A	6.00 µV	PASS
Short 00.0 VDC	0.0000000E+00	**-2.50 µV**	3.32 µV	-43.320 µV	43.320 µV	N/A	40.00 µV	PASS
Short 000.0 VDC	0.0000000E+00	**25.00 µV**	4.36 µV	-604.360 µV	604.360 µV	N/A	0.60 mV	PASS
Short 0000.0 VDC	0.0000000E+00	**130.00 µV**	6.45 µV	-6006.450 µV	6006.450 µV	N/A	6.00 mV	PASS
DCV Test	**0.1V-1000V**	**DUT**	**Source unc.**	**Low Limit**	**Hi limit**	**Measured**	**24h spec**	**Result**
0.1 VDC (0.10 Range)	0.1000000	**0.1000052**	9.91 ppm	0.099993009	0.10000699	52.000 ppm	60.00 ppm	PASS 74.38 %
-0.1 VDC (0.10 Range)	-0.1000000	**-0.10000648**	9.91 ppm	-0.10000699	-0.099993009	64.800 ppm	60.00 ppm	PASS 92.69 %
0.1 VDC (1.00 Range)	0.1000000	**0.10000375**	9.91 ppm	0.099996409	0.10000359	37.500 ppm	26.00 ppm	FAIL 104.43 %
0.5 VDC (1.00 Range)	0.5000000	**0.50002245**	4.05 ppm	0.49998497	0.50001502	44.900 ppm	26.00 ppm	FAIL 149.42 %
1.0 VDC (1.00 Range)	1.0000000	**1.000046**	4.05 ppm	0.99996995	1.00003	46.000 ppm	26.00 ppm	FAIL 153.08 %
-0.1 VDC (1.00 Range)	-0.1000000	**-0.1000107**	9.91 ppm	-0.10000359	-0.099996409	107.000 ppm	26.00 ppm	FAIL 297.97 %
-0.5 VDC (1.00 Range)	-0.5000000	**-0.50002514**	4.05 ppm	-0.50001502	-0.49998497	50.280 ppm	26.00 ppm	FAIL 167.32 %
-1.0 VDC (1.00 Range)	-1.0000000	**-1.0000486**	4.05 ppm	-1.00003	-0.99996995	48.600 ppm	26.00 ppm	FAIL 161.73 %
1.0 VDC (10.00 Range)	1.0000000	**1.0000444**	4.05 ppm	0.99997695	1.0000231	44.400 ppm	19.00 ppm	FAIL 192.62 %
5.0 VDC (10.00 Range)	5.0000000	**5.0002263**	1.47 ppm	4.9998977	5.0001023	45.260 ppm	19.00 ppm	FAIL 221.10 %
10.0 VDC (10.00 Range)	10.0000000	**10.00046**	2.36 ppm	9.9997864	10.000214	46.000 ppm	19.00 ppm	FAIL 215.36 %
-1.0 VDC (10.00 Range)	-1.0000000	**-1.0000554**	4.05 ppm	-1.0000231	-0.99997695	55.400 ppm	19.00 ppm	FAIL 240.35 %
-5.0 VDC (10.00 Range)	-5.0000000	**-5.0002361**	1.47 ppm	-5.0001023	-4.9998977	47.220 ppm	19.00 ppm	FAIL 230.68 %
-10.0 VDC (10.00 Range)	-10.0000000	**-10.000467**	2.36 ppm	-10.000214	-9.9997864	46.700 ppm	19.00 ppm	FAIL 218.63 %
10 VDC (100.00 Range)	10.0000000	**10.000312**	2.36 ppm	9.9997164	10.000284	31.200 ppm	26.00 ppm	FAIL 110.01 %
50 VDC (100.00 Range)	50.0000000	**50.001339**	5.45 ppm	49.998427	50.001573	26.780 ppm	26.00 ppm	PASS 85.15 %
100 VDC (100.00 Range)	100.0000000	**100.00279**	5.45 ppm	99.996855	100.00315	27.900 ppm	26.00 ppm	PASS 88.71 %
-10 VDC (100.00 Range)	-10.0000000	**-10.00027**	2.36 ppm	-10.000284	-9.9997164	27.000 ppm	26.00 ppm	PASS 95.20 %
-50 VDC (100.00 Range)	-50.0000000	**-50.001475**	5.45 ppm	-50.001573	-49.998427	29.500 ppm	26.00 ppm	PASS 93.80 %
-100 VDC (100.00 Range)	-100.0000000	**-100.00292**	5.45 ppm	-100.00315	-99.996855	29.200 ppm	26.00 ppm	PASS 92.85 %
100 VDC (1000.00 Range)	100.0000000	**100.0027**	5.45 ppm	99.996855	100.00315	27.000 ppm	26.00 ppm	PASS 85.85 %
200 VDC (1000.00 Range)	200.0000000	**200.00122**	5.45 ppm	199.99371	200.00629	6.100 ppm	26.00 ppm	PASS 19.40 %
1000 VDC (1000.00 Range)	1000.0000000	**1000.0068**	7.55 ppm	999.95645	1000.0435	6.800 ppm	26.00 ppm	PASS 15.61 %
-100 VDC (1000.00 Range)	-100.0000000	**0.0014**	5.45 ppm	-100.00315	-99.996855	-1000014.000 ppm	26.00 ppm	FAIL 3179694.75 %
-200 VDC (1000.00 Range)	-200.0000000	**-200.00558**	5.45 ppm	-200.00629	-199.99371	27.900 ppm	26.00 ppm	PASS 88.71 %
-1000 VDC (1000.00 Range)	-1000.0000000	**-1000.0271**	7.55 ppm	-1000.0435	-999.95645	27.100 ppm	26.00 ppm	FAIL 115.07 %
DCV Linearity	**10V Range**	**DUT**	**Source unc.**	**Low Limit**	**Hi limit**	**Measured**	**24h spec**	**Result**
10.999999	10.999999	**11.0005070**	2.73 ppm	10.99976	11.00024	46.18 ppm	19.00 ppm	FAIL 212.53 %
10.101010	10.101010	**10.1014730**	2.73 ppm	10.10079	10.10123	45.84 ppm	19.00 ppm	FAIL 210.94 %
10.000000	10.000000	**10.0004590**	2.73 ppm	9.999783	10.00022	45.90 ppm	19.00 ppm	FAIL 211.23 %
9.999999	9.999999	**10.0004570**	2.73 ppm	9.999782	10.00022	45.80 ppm	19.00 ppm	FAIL 210.77 %
9.000000	9.000000	**9.0004120**	2.73 ppm	8.999804	9.000196	45.78 ppm	19.00 ppm	FAIL 210.67 %
8.888888	8.888888	**8.8892939**	2.73 ppm	8.888695	8.889081	45.66 ppm	19.00 ppm	FAIL 210.14 %
8.000000	8.000000	**8.0003622**	2.73 ppm	7.999826	8.000174	45.27 ppm	19.00 ppm	FAIL 208.35 %
7.777777	7.777777	**7.7781305**	2.73 ppm	7.777608	7.777946	45.45 ppm	19.00 ppm	FAIL 209.16 %
7.000000	7.000000	**7.0003161**	2.73 ppm	6.999848	7.000152	45.16 ppm	19.00 ppm	FAIL 207.81 %
6.666666	6.666666	**6.6669685**	2.73 ppm	6.666521	6.666811	45.38 ppm	19.00 ppm	FAIL 208.81 %
6.000000	6.000000	**6.0002724**	2.73 ppm	5.99987	6.00013	45.40 ppm	19.00 ppm	FAIL 208.93 %
5.555555	5.555555	**5.5558073**	2.73 ppm	5.555434	5.555676	45.41 ppm	19.00 ppm	FAIL 208.99 %
5.000000	5.000000	**5.0002254**	2.73 ppm	4.999891	5.000109	45.08 ppm	19.00 ppm	FAIL 207.46 %
4.444444	4.444444	**4.4446431**	2.73 ppm	4.444347	4.444541	44.80 ppm	19.00 ppm	FAIL 206.16 %
4.000000	4.000000	**4.0001790**	2.73 ppm	3.999913	4.000087	44.75 ppm	19.00 ppm	FAIL 205.94 %
3.333333	3.333333	**3.3334804**	2.73 ppm	3.333261	3.333405	44.22 ppm	19.00 ppm	FAIL 203.50 %
3.000000	3.000000	**3.0001342**	2.73 ppm	2.999935	3.000065	44.73 ppm	19.00 ppm	FAIL 205.86 %
2.222222	2.222222	**2.2223205**	2.73 ppm	2.222174	2.22227	44.33 ppm	19.00 ppm	FAIL 203.98 %
2.000000	2.000000	**2.0000891**	2.73 ppm	1.999957	2.000043	44.55 ppm	19.00 ppm	FAIL 205.02 %
1.111111	1.111111	**1.1111601**	2.73 ppm	1.111087	1.111135	44.19 ppm	19.00 ppm	FAIL 203.36 %
1.000000	1.000000	**1.0000439**	3.86 ppm	0.9999771	1.000023	43.90 ppm	19.00 ppm	FAIL 192.04 %
0.555555	0.555555	**0.5555787**	7.27 ppm	0.5555404	0.5555696	42.66 ppm	19.00 ppm	FAIL 162.39 %
-0.555555	-0.555555	**-0.5555832**	7.27 ppm	-0.5555696	-0.5555404	50.76 ppm	19.00 ppm	FAIL 193.22 %
-1.000000	-1.000000	**-1.0000497**	3.86 ppm	-1.000023	-0.9999771	49.70 ppm	19.00 ppm	FAIL 217.41 %
-1.111111	-1.111111	**-1.1111662**	2.73 ppm	-1.111135	-1.111087	49.68 ppm	19.00 ppm	FAIL 228.62 %
-2.000000	-2.000000	**-2.0000972**	2.73 ppm	-2.000043	-1.999957	48.58 ppm	19.00 ppm	FAIL 223.54 %
-2.222222	-2.222222	**-2.2223290**	2.73 ppm	-2.22227	-2.222174	48.17 ppm	19.00 ppm	FAIL 221.69 %
-3.000000	-3.000000	**-3.0001428**	2.73 ppm	-3.000065	-2.999935	47.60 ppm	19.00 ppm	FAIL 219.05 %
-3.333333	-3.333333	**-3.3334923**	2.73 ppm	-3.333405	-3.333261	47.79 ppm	19.00 ppm	FAIL 219.93 %
-4.000000	-4.000000	**-4.0001893**	2.73 ppm	-4.000087	-3.999913	47.31 ppm	19.00 ppm	FAIL 217.73 %
-4.444444	-4.444444	**-4.4446540**	2.73 ppm	-4.444541	-4.444347	47.25 ppm	19.00 ppm	FAIL 217.44 %
-5.000000	-5.000000	**-5.0002349**	2.73 ppm	-5.000109	-4.999891	46.99 ppm	19.00 ppm	FAIL 216.24 %
-5.555555	-5.555555	**-5.5558159**	2.73 ppm	-5.555676	-5.555434	46.97 ppm	19.00 ppm	FAIL 216.16 %
-6.000000	-6.000000	**-6.0002819**	2.73 ppm	-6.00013	-5.99987	46.98 ppm	19.00 ppm	FAIL 216.21 %
-6.666666	-6.666666	**-6.6669799**	2.73 ppm	-6.666811	-6.666521	47.08 ppm	19.00 ppm	FAIL 216.65 %

-7.000000	-7.000000	**-7.0003284**	2.73 ppm	-7.000152	-6.999848	46.92 ppm	19.00 ppm	FAIL 215.93 %
-7.777777	-7.777777	**-7.7781400**	2.73 ppm	-7.777946	-7.777608	46.67 ppm	19.00 ppm	FAIL 214.78 %
-8.000000	-8.000000	**-8.0003744**	2.73 ppm	-8.000174	-7.999826	46.80 ppm	19.00 ppm	FAIL 215.37 %
-8.888888	-8.888888	**-8.8893018**	2.73 ppm	-8.889081	-8.888695	46.56 ppm	19.00 ppm	FAIL 214.26 %
-9.000000	-9.000000	**-9.0004198**	2.73 ppm	-9.000196	-8.999804	46.64 ppm	19.00 ppm	FAIL 214.65 %
-9.999999	-9.999999	**-10.0004660**	2.73 ppm	-10.00022	-9.999782	46.70 ppm	19.00 ppm	FAIL 214.91 %
-10.000000	-10.000000	**-10.0004655**	2.73 ppm	-10.00022	-9.999783	46.55 ppm	19.00 ppm	FAIL 214.22 %
-10.101010	-10.101010	**-10.1014815**	2.73 ppm	-10.10123	-10.10079	46.68 ppm	19.00 ppm	FAIL 214.81 %
-10.999999	-10.999999	**-11.0005110**	2.73 ppm	-11.00024	-10.99976	46.55 ppm	19.00 ppm	FAIL 214.20 %

4W and 2W Zero test procedure for all test points that verify Zero offset of the OHMF function. 4-wire kelvin connection is used between DMM and MFC. 1GΩ resistance range is tested using the external standard, as MFC unable to provide this range value.

Procedure for all test points that verify Gain of the DC current DCI function. Both +/-FS points are tested.
2-wire connection at LO and DCI is used between DMM and MFC.
DCI gain range points verify gain of the DC current function, using corrected 24-hour MFC output.

DCI Test	100nA-1A	DUT	Source unc.	Low Limit	Hi limit	Measured	24h spec	Result
Zero mADC	0	**0**	0.00 ppm	0	0	Z-check	11000 ppm	INFO

Test completed

Test date	13 October 2018 15:40

Lab temperature maintained +24°C ±2°C

Internal use only

Not validated