

Manufacturer	KEITHLEY INSTRUMENTS	Calibration date	March 16 2021
Model Number	Model 2002/STD	Ambient Temperature	23.69 °C
Serial	REDACTED	Relative Humidity	11.90 %
ID Number	Calibration	Pressure	1019.74
Notes	Test final calibration adjustment	Test type	Front cable terminals, Fluke cables

Actual measurement uncertainty available upon request was calculated using the expanded method and is expressed in values at approximately 95% confidence level (coverage factor of K = 2.0).

Certificate statements are based on test results within specified limits without reduction of the uncertainty of the test and/or measurement. The test and measurement data here relate only to the item tested and/or measured. Due date that appears on the Certificate of Calibration and labels are determined by the customer and does not imply conformance to a standard. All measurements below use 24 hour Keithley specifications.

Calibration adjustment performed: Normal procedure per Keithley Document Number 2002-905-01 (Rev.D from May 2004)

Calibration adjustment performed: Low level manufacturer procedure per Keithley Document Number 2002-905-01 (Rev.D from May 2004)

Reference standard	Mfg	Model	Options	Serial / Unc	CEID	Calibration date	Due date
MFC	Fluke	5720A	03/HLK	9572003	XHC1	02/27/2021	05/27/2021
Amplifier	Fluke	5725A		5930005	XHB1	02/27/2021	05/27/2021
DC STD	xDevs.com	792X[2]	9.9999698 VDC	±0.3 ppm	XD01	12/29/2020	06/29/2021
STDR	ESI	SR104	10000.0026 KΩ	±0.15 ppm	G202088930104	03/17/2020	03/17/2021
STDR	xDevs.com/Fluke	SL935	1.00006192 Ω	±0.17 ppm	XR03	12/12/2020	12/12/2021
STDR	xDevs.com/Fluke	SL935	9999.9741 kΩ	±0.17 ppm	XR02	10/15/2020	10/15/2021
STDR	xDevs.com	TRX-1G	995903759 GΩ	±0.51 %	WS1	03/12/2021	03/12/2022
STDR	IET	SRL-100M	100.00902 MΩ	±12 ppm	K1-1309646	27/10/2020	27/10/2021
DMM	HP	3458A	001,X02	MY45040325	XD2	08/25/2020	02/25/2021
DMM	HP	3458A	001,X02	Process DMM	XD3	12/28/2020	06/28/2021
Divider	Fluke	752A	4295200		XR01	02/23/2021	02/25/2021
STDR	Fluke	742A-1	1.00004372 Ω	±0.45 ppm	NR02	11/30/2020	11/30/2021

MFC last calibrated	18.0 days ago	MFC since DCV ZERO	1.0 days ago
MFC since WBFLAT	67.0 days ago	MFC since WBGAIN	67.0 days ago
MFC Confidence level	24h 95% REL	MFC Calibrate date	2021-02-27 00:00:00
MFC Calibrate date Zero	2021-03-16 00:00:00	Calibrate date WB Flatness	2021-10-09 00:00:00
Calibrate date WB Gain	2021-10-09 00:00:00	CAL CONST 6.5V reference voltage	6.95747918634
CAL CONST 13V reference voltage	13.8553042892	CAL CONST 22V range positive zero	398.17913
CAL CONST 22V range negative zero	398.17871	CAL CONST DAC Linearity	0.0
CAL CONST 10KOHM true output resistance	9999.79616242	CAL CONST 10KOHM standard resistance	9998.74928595
CAL CONST, Zero calibration temperature	23.2999992371	CAL CONST, All calibration temp	23.2999992371
Booster type	VB5725,IB5725	Current output posts	AUX
Calibrate date 5725A AMP	2021-02-27 00:00:00	Calibrated days ago	Debug
CAL CONST, Amp ACAL temperature	23.2999992371	CAL CONST, Amp CalCheck temperature	23.2999992371

Total uncertainty of each calibration point calculated with RSS

$$U_{95\%} = \sqrt{U_{SRC}^2 + U_{DUT}^2} * 2$$

Meter Info	KEITHLEY INSTRUMENTS INC.,MODEL 2002,XXXXXXXX,B02 /A02	Test date start	16 March 2021 17:29
Test specification interval	24 hour DUT spec	Line frequency	120V 60 Hz
Next calibration date	2022,03,16	Last calibration date	2021,03,16
DUT Δ temperature to cal	0.20 °C	Last calibration temperature	23.50 °C

Service information

Last calibration temperature

23.50 °C

All CAL values

1.000185E+00,7.078147E-05,1.000099E+01,-1.796422E-05,9.999821E-01,-3.155505E-07,9.998638E+00,1.336065E-05,9.998756E+01,4.969910E+02,3.783676E-03,6.742214E-03,2.488222E-03,4.093085E-03,6.689468E-03,1.235000E+02,1.430000E+02,1.292722E-05,1.104514E-05,1.041361E-05,1.116186E-05,1.175587E-05,-3.805449E-05,-7.100349E-07,-2.956618E-06,-3.043017E-07,-3.043007E-07,-1.492946E-06,-2.115411E-05,-2.591419E-07,-2.820687E-07,-1.139906,-8.287352E-07,-1.111650E-06,1.423224E+00,1.423224E+00,5.592156E-06,1.423232E+00,1.423225E+00,-1.065517E-06,1.423224E+00,1.423224E+00,6.924080E-05,1.423295E+00,1.423225E+00,-1.368149E-05,1.778812E+00,1.778810E+00,8.659604,1.779699E+00,1.778814E+00,-1.447350E-05,1.778813E+00,1.778811E+00,6.615325E-03,1.785450E+00,1.778814E+00,1.117026E+00,2.792487E-01,2.792492E+00,1.116935E-01,1.396142E+00,7.272176E-01,2.666257E-01,1.013204E+00,1.013388E+00,2.436613E+00,1.443487E+00,1.013299E+00,2.436525E+00,1.425250E+00,1.266608E+00,3.045432E+00,1.781336E+00,9.500731E-01,2.728900E+00,1.779059E+00,1.396047E+00,1.396026E+00,1.398045E+00,1.411738E+00,1.397657E+00,1.999993E+00,2.000000E+00,2.000000E+01,9.999837E+05,1.899893E+05,1.899928E+04,1.899888E+03,1.899928E+02,1.900022E+01,2.000004,2.000000E-03,2.000000E-02,2.000000E-01,2.000000E+00,4.537498E+01,1.999625E+00,2.000054E+00,1.240000E+02,4.022181E-01,2.000063E+00,1.225000E+02,1.430000E+02,1.499211E+00,1.499762E+00,1.999800E+00,9.600000E+01,1.210000E+02,1.022188E-02,5.584789E-01,1.396159E-01,-1.396243E+00,-4.543686E-07,-3.039623E-06,-4.034696E-05,-3.175012E-07,-7.329622E-07,-1.182241E-06,-2.527338E-06,-1.137775E-06,3.836307E-06,-1.140554E-06,6.739327E-05,-1.508489E-05,8.417525E-04,-1.511778E-05,6.576378E-03,1.999586E+00,2.000415E+00,1.083148E+00,2.000161E+00

Reference

Final performance check (front)

AS RETURNED DUT Condition

calkit-5720ah2

Test procedure : \$Id: k2002.py | Rev 2091 | 2021/02/23 14:14:42 tin_fpga \$

Source procedure : \$Id: f5720b.py | Rev 2004 | 2021/01/22 19:22:14 tin_fpga \$

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	0.000000E+00	-0.27 μ V	0.50 μ V	-1.700 μ V	1.700 μ V	N/A	1.20 μ V	PASS
Short 0.0 VDC	0.000000E+00	-0.65 μ V	0.50 μ V	-4.500 μ V	4.500 μ V	N/A	4.00 μ V	PASS
Short 00.0 VDC	0.000000E+00	-0.30 μ V	0.50 μ V	-80.500 μ V	80.500 μ V	N/A	80.00 μ V	PASS
Short 000.0 VDC	0.000000E+00	18.00 μ V	0.50 μ V	-600.500 μ V	600.500 μ V	N/A	0.60 mV	PASS
Short 0000.0 VDC	0.000000E+00	-0.00 μ V	0.50 μ V	-6000.500 μ V	6000.500 μ V	N/A	6.00 mV	PASS
DCV Test	0.1V-1000V	DUT	Source unc.	Low Limit	Hi limit	Measured	24h spec	Result
0.02 VDC (0.20 Range)	0.0200000	0.020000008	24.00 ppm	0.01999885	0.02000115	0.400 ppm	33.50 ppm	PASS 0.97 %
0.1 VDC (0.20 Range)	0.1000000	0.10000007	8.00 ppm	0.09999825	0.10000175	0.670 ppm	9.50 ppm	PASS 5.39 %
0.2 VDC (0.20 Range)	0.2000000	0.19999988	7.27 ppm	0.19999725	0.20000275	-0.587 ppm	6.50 ppm	PASS 6.02 %
-0.02 VDC (0.20 Range)	-0.0200000	-0.020000216	24.00 ppm	-0.02000115	-0.01999885	10.800 ppm	33.50 ppm	PASS 26.21 %
-0.1 VDC (0.20 Range)	-0.1000000	-0.10000028	8.00 ppm	-0.10000175	-0.09999825	2.795 ppm	9.50 ppm	PASS 22.50 %
-0.2 VDC (0.20 Range)	-0.2000000	-0.20000061	7.27 ppm	-0.20000275	-0.19999725	3.075 ppm	6.50 ppm	PASS 31.53 %
0.2 VDC (2.00 Range)	0.2000000	0.19999954	12.00 ppm	0.19999676	0.20000324	-2.300 ppm	4.20 ppm	PASS 18.09 %
1.0 VDC (2.00 Range)	1.0000000	0.99999923	3.86 ppm	0.99999434	1.0000057	-0.770 ppm	1.80 ppm	PASS 18.08 %
1.9 VDC (2.00 Range)	1.9000000	1.899999	3.86 ppm	1.8999898	1.9000102	-0.505 ppm	1.52 ppm	PASS 12.18 %
2.0 VDC (2.00 Range)	2.0000000	1.999999	3.86 ppm	1.9999893	2.0000107	-0.480 ppm	1.50 ppm	PASS 11.59 %
-0.2 VDC (2.00 Range)	-0.2000000	-0.20000137	12.00 ppm	-0.20000324	-0.19999676	6.850 ppm	4.20 ppm	PASS 53.88 %
-1.0 VDC (2.00 Range)	-1.0000000	-1.0000033	3.86 ppm	-1.0000057	-0.99999434	3.280 ppm	1.80 ppm	PASS 77.01 %
-1.9 VDC (2.00 Range)	-1.9000000	-1.9000064	3.86 ppm	-1.9000102	-1.8999898	3.389 ppm	1.52 ppm	PASS 81.73 %
-2.0 VDC (2.00 Range)	-2.0000000	-2.0000068	3.86 ppm	-2.0000107	-1.9999893	3.400 ppm	1.50 ppm	PASS 82.10 %
1.0 VDC (20.00 Range)	1.0000000	1.0000004	3.86 ppm	0.99999294	1.0000071	0.400 ppm	3.20 ppm	PASS 7.98 %
10.0 VDC (20.00 Range)	10.0000000	9.9999959	2.77 ppm	9.9999583	10.000042	-0.410 ppm	1.40 ppm	PASS 13.21 %
19.0 VDC (20.00 Range)	19.0000000	18.999999	2.75 ppm	18.999923	19.000077	-0.045 ppm	1.31 ppm	PASS 1.47 %
20.0 VDC (20.00 Range)	20.0000000	19.999999	2.73 ppm	19.999919	20.000081	-0.030 ppm	1.30 ppm	PASS 0.99 %
-1.0 VDC (20.00 Range)	-1.0000000	-1.0000018	3.86 ppm	-1.0000071	-0.99999294	1.800 ppm	3.20 ppm	PASS 35.90 %
-10.0 VDC (20.00 Range)	-10.0000000	-10.000009	2.77 ppm	-10.000042	-9.9999583	0.885 ppm	1.40 ppm	PASS 28.51 %
-19.0 VDC (20.00 Range)	-19.0000000	-19.000029	2.75 ppm	-19.000077	-18.999923	1.524 ppm	1.31 ppm	PASS 50.05 %
-20.0 VDC (20.00 Range)	-20.0000000	-20.000033	2.73 ppm	-20.000081	-19.999919	1.633 ppm	1.30 ppm	PASS 53.99 %
10 VDC (200.00 Range)	10.0000000	9.9999975	2.77 ppm	9.9998423	10.000158	-0.250 ppm	13.00 ppm	PASS 1.88 %
100 VDC (200.00 Range)	100.0000000	99.999955	3.73 ppm	99.999047	100.00095	-0.450 ppm	5.80 ppm	PASS 6.53 %
200 VDC (200.00 Range)	200.0000000	199.99992	3.73 ppm	199.99817	200.00183	-0.385 ppm	5.40 ppm	PASS 5.87 %
-10 VDC (200.00 Range)	-10.0000000	-10.000034	2.77 ppm	-10.000158	-9.9998423	3.400 ppm	13.00 ppm	PASS 25.58 %
-100 VDC (200.00 Range)	-100.0000000	-100.00034	3.73 ppm	-100.00095	-99.999047	3.430 ppm	5.80 ppm	PASS 49.74 %
-200 VDC (200.00 Range)	-200.0000000	-200.00071	3.73 ppm	-200.00183	-199.99817	3.565 ppm	5.40 ppm	PASS 54.32 %
100 VDC (1000.00 Range)	100.0000000	99.99991	3.73 ppm	99.999047	100.00095	-0.900 ppm	5.80 ppm	PASS 13.05 %
200 VDC (1000.00 Range)	200.0000000	199.9998	3.73 ppm	199.99817	200.00183	-1.000 ppm	5.40 ppm	PASS 15.24 %
1000 VDC (1000.00 Range)	1000.0000000	1000.0022	5.45 ppm	999.986	1000.013	2.230 ppm	5.08 ppm	PASS 29.93 %
-100 VDC (1000.00 Range)	-100.0000000	-100.00002	3.73 ppm	-100.0009	-99.99904	0.200 ppm	5.80 ppm	PASS 2.90 %
-200 VDC (1000.00 Range)	-200.0000000	-200.00009	3.73 ppm	-200.0018	-199.9981	0.450 ppm	5.40 ppm	PASS 6.86 %
-1000 VDC (1000.00 Range)	-1000.0000000	-1000.003	5.45 ppm	-1000.013	-999.986	2.830 ppm	5.08 ppm	PASS 37.98 %

4W test procedure for all test points that verify Gain 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.

OHM Test	Reference	DUT	Source unc.	Low Limit	Hi limit	Measured	24h spec	Result
1 Ω	0.999785 Ω	0.9997885 Ω	32.0 ppm	9.9965801E-01	9.9991199E-01	3.501 ppm	95.02 ppm	PASS, 3.49 % of 100.26 ppm
1.9 Ω	1.899828 Ω	1.8998303 Ω	25.0 ppm	1.8996810E+00	1.8999750E+00	1.211 ppm	52.37 ppm	PASS, 2.10 % of 57.61 ppm
10 Ω	10.000582 Ω	10.0005903 Ω	5.0 ppm	1.0000392E+01	1.0000772E+01	0.830 ppm	14.00 ppm	PASS, 5.70 % of 14.56 ppm
19 Ω	19.000182 Ω	19.0002548 Ω	4.0 ppm	1.8999921E+01	1.9000443E+01	3.832 ppm	9.74 ppm	PASS, 36.40 % of 10.53 ppm
100 Ω	99.99626 Ω	99.996288 Ω	1.7 ppm	9.9994990E+01	9.9997530E+01	0.280 ppm	11.00 ppm	PASS, 2.52 % of 11.13 ppm
190 Ω	189.99261 Ω	189.992767 Ω	1.7 ppm	1.8999074E+02	1.8999448E+02	0.826 ppm	8.16 ppm	PASS, 9.92 % of 8.33 ppm
1.0 kΩ	1000.0237 Ω	1000.02276 Ω	1.7 ppm	1.0000189E+03	1.0000285E+03	-0.940 ppm	3.10 ppm	PASS, 26.59 % of 3.54 ppm
1.9 kΩ	1899.8875 Ω	1899.88722 Ω	1.7 ppm	1.8998789E+03	1.8998961E+03	-0.147 ppm	2.82 ppm	PASS, 4.48 % of 3.29 ppm
10 kΩ	9999.799 Ω	9999.7945 Ω	1.6 ppm	9.9997520E+03	9.9998460E+03	-0.450 ppm	3.10 ppm	PASS, 12.90 % of 3.49 ppm
19 kΩ	18999.279 Ω	18999.2788 Ω	1.7 ppm	1.8999193E+04	1.8999365E+04	-0.011 ppm	2.82 ppm	PASS, 0.32 % of 3.29 ppm
100 kΩ	99994.84 Ω	99995.34 Ω	2.0 ppm	9.9993990E+04	9.9995690E+04	5.000 ppm	6.50 ppm	PASS, 73.52 % of 6.80 ppm
190 kΩ	189989.33 Ω	189989.83 Ω	2.0 ppm	1.8998781E+05	1.8999085E+05	2.632 ppm	6.03 ppm	PASS, 41.45 % of 6.35 ppm
1.0 MΩ	999983.8 Ω	999983.9 Ω	2.5 ppm	9.9996870E+05	9.999890E+05	0.100 ppm	12.60 ppm	PASS, 0.78 % of 12.85 ppm
1.9 MΩ	1899981.1 Ω	1899976.6 Ω	3.0 ppm	1.8999520E+06	1.9000102E+06	-2.368 ppm	12.32 ppm	PASS, 18.98 % of 12.48 ppm
10 MΩ	9999114 Ω	9998986 Ω	10.0 ppm	9.9985101E+06	9.9997179E+06	-12.801 ppm	50.40 ppm	PASS, 24.91 % of 51.38 ppm
19 MΩ	18998748 Ω	18998434 Ω	20.0 ppm	1.8997414E+07	1.9000082E+07	-16.527 ppm	50.21 ppm	PASS, 30.58 % of 54.05 ppm
100 MΩ	100005030 Ω	100004470 Ω	50.0 ppm	9.9984829E+07	1.0002523E+08	-5.600 ppm	152.00 ppm	PASS, 3.50 % of 160.01 ppm
1 GΩ	995903759 Ω	995750925 Ω	510.0 ppm	9.953958E+08	9.964117E+08	-153.46 ppm	755.00 ppm	PASS, 16.84 % of 911.11 ppm

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.

OHM ZERO 4W	DUT	Source unc.	Low Limit	Hi limit	24h spec	Result
20R Ω Range	-0.0000164 Ω	5.000e-05 Ω	-5e-05	5e-05	9.5000e-06 Ω	PASS
200R Ω Range	-0.0002840 Ω	5.500e-04 Ω	-0.00055	0.00055	2.8000e-06 Ω	PASS
2K Ω Range	0.0005100 Ω	5.500e-03 Ω	-0.0055	0.0055	2.8000e-06 Ω	PASS
20K Ω Range	-0.0042000 Ω	5.500e-02 Ω	-0.055	0.055	2.8000e-06 Ω	PASS
200K Ω Range	-0.0057000 Ω	5.500e-01 Ω	-0.55	0.55	2.8000e-06 Ω	PASS
OHM ZERO 2W	DUT	Source unc.	Low Limit	Hi limit	24h spec	Result
20R Ω Range	0.2619200 Ω	5.000e-01 Ω	-0.5	0.5	9.5000e-06 Ω	PASS
200R Ω Range	0.2611000 Ω	5.000e-01 Ω	-0.5	0.5	2.8000e-06 Ω	PASS
2K Ω Range	0.2600000 Ω	5.000e-01 Ω	-0.5	0.5	2.8000e-06 Ω	PASS
20K Ω Range	0.2580000 Ω	4.000e-01 Ω	-0.4	0.4	2.8000e-06 Ω	PASS
200K Ω Range	0.2500000 Ω	8.000e-01 Ω	-0.8	0.8	2.8000e-06 Ω	PASS
2M Ω Range	0.0000000 Ω	9.000e+00 Ω	-9	9	2.8000e-06 Ω	PASS
20M Ω Range	0.0000000 Ω	9.000e+01 Ω	-90	90	2.8000e-06 Ω	PASS
200M Ω Range	0.0000000 Ω	2.000e+04 Ω	-20000.0	20000.0	2.8000e-06 Ω	PASS
1G Ω Range	0.0000000 Ω	1.000e+05 Ω	-100000	100000	2.8000e-06 Ω	PASS

Procedure for all test points in the AC performance verification for SYNCronous mode. This is highest AC accuracy test. AC-measurements does not suffer from TEMF offsets, test connection can be made using shielded leads terminated with dual banana plugs. MFC main AC output is used as reference source

ACV SYNC Test	DUT	w/Guardband	Low Limit	Hi limit	Measured	24h spec	Result, % spec
0.02 V AC+DC @ 10 Hz	0.020048685	0.0400 %	0.019906	0.020094	0.2434 %	0.4325 %	PASS 56.04 %
0.02 V AC+DC @ 20 Hz	0.020047235	0.0280 %	0.019908	0.020092	0.2362 %	0.4325 %	PASS 54.49 %
0.02 V AC+DC @ 50 Hz	0.020047335	0.0270 %	0.019908	0.020092	0.2367 %	0.4325 %	PASS 54.62 %
0.02 V AC+DC @ 60 Hz	0.02005385	0.0270 %	0.019908	0.020092	0.2692 %	0.4325 %	PASS 62.13 %
0.02 V AC+DC @ 100 Hz	0.020046615	0.0270 %	0.019908	0.020092	0.2331 %	0.4325 %	PASS 53.79 %
0.02 V AC+DC @ 1.0 kHz	0.02005111	0.0270 %	0.019908	0.020092	0.2555 %	0.4325 %	PASS 58.97 %
0.02 V AC+DC @ 6.25 kHz	0.02002778	0.0270 %	0.019908	0.020092	0.1389 %	0.4325 %	PASS 32.05 %
0.02 V AC+DC @ 10.0 kHz	0.02002902	0.0270 %	0.019908	0.020092	0.1451 %	0.4325 %	PASS 33.48 %
0.02 V AC+DC @ 20.0 kHz	0.020030815	0.0270 %	0.019908	0.020092	0.1541 %	0.4325 %	PASS 35.56 %
0.02 V AC+DC @ 50.0 kHz	0.020034695	0.0370 %	0.019906	0.020094	0.1735 %	0.4325 %	PASS 39.96 %
0.02 V AC+DC @ 100.0 kHz	0.02002304	0.0650 %	0.019921	0.020080	0.1152 %	0.3325 %	PASS 34.00 %
0.02 V AC+DC @ 200.0 kHz	0.019997075	0.0800 %	0.019828	0.020172	-0.0146 %	0.7825 %	PASS 1.86 %
0.02 V AC+DC @ 300.0 kHz	0.020006185	0.0800 %	0.019828	0.020172	0.0309 %	0.7825 %	PASS 3.93 %
0.02 V AC+DC @ 500.0 kHz	0.020107795	0.2100 %	0.019538	0.020462	0.5390 %	2.1000 %	PASS 25.54 %
0.2 V AC+DC @ 10 Hz	0.19998848	0.0260 %	0.199598	0.200402	-0.0058 %	0.1750 %	PASS 3.25 %
0.2 V AC+DC @ 20 Hz	0.19999025	0.0115 %	0.199627	0.200373	-0.0049 %	0.1750 %	PASS 2.78 %
0.2 V AC+DC @ 50 Hz	0.1999933	0.0105 %	0.199889	0.200111	-0.0034 %	0.0450 %	PASS 7.25 %
0.2 V AC+DC @ 60 Hz	0.19998917	0.0105 %	0.199889	0.200111	-0.0054 %	0.0450 %	PASS 11.72 %
0.2 V AC+DC @ 100 Hz	0.19999723	0.0105 %	0.199889	0.200111	-0.0014 %	0.0450 %	PASS 2.99 %
0.2 V AC+DC @ 1.0 kHz	0.20001167	0.0105 %	0.199889	0.200111	0.0058 %	0.0450 %	PASS 12.63 %
0.2 V AC+DC @ 6.25 kHz	0.2000096	0.0105 %	0.199879	0.200121	0.0048 %	0.0500 %	PASS 9.40 %
0.2 V AC+DC @ 10.0 kHz	0.20001192	0.0105 %	0.199879	0.200121	0.0060 %	0.0500 %	PASS 11.67 %
0.2 V AC+DC @ 20.0 kHz	0.20001495	0.0105 %	0.199879	0.200121	0.0075 %	0.0500 %	PASS 14.64 %
0.2 V AC+DC @ 50.0 kHz	0.20000028	0.0205 %	0.199829	0.200171	0.0001 %	0.0650 %	PASS 0.20 %
0.2 V AC+DC @ 100.0 kHz	0.19982026	0.0485 %	0.199273	0.200727	-0.0899 %	0.3150 %	PASS 28.20 %
0.2 V AC+DC @ 200.0 kHz	0.1992887	0.0800 %	0.198290	0.201710	-0.3557 %	0.7750 %	PASS 45.65 %
0.2 V AC+DC @ 300.0 kHz	0.19895505	0.0800 %	0.198290	0.201710	-0.5225 %	0.7750 %	PASS 67.06 %
0.2 V AC+DC @ 500.0 kHz	0.19885257	0.1200 %	0.195560	0.204440	-0.5737 %	2.1000 %	PASS 27.28 %
0.2 V AC+DC @ 1.0 MHz	0.20043748	0.2600 %	0.195280	0.204720	0.2187 %	2.1000 %	PASS 10.34 %
2.0 V AC+DC @ 10 Hz	2.0002936	0.0220 %	1.996060	2.003940	0.0147 %	0.1750 %	PASS 8.32 %
2.0 V AC+DC @ 20 Hz	2.0003021	0.0083 %	1.996335	2.003665	0.0151 %	0.1750 %	PASS 8.62 %
2.0 V AC+DC @ 50 Hz	2.0002923	0.0041 %	1.999018	2.000982	0.0146 %	0.0450 %	PASS 32.35 %
2.0 V AC+DC @ 60 Hz	2.0003136	0.0041 %	1.999018	2.000982	0.0157 %	0.0450 %	PASS 34.71 %
2.0 V AC+DC @ 100 Hz	2.0002822	0.0041 %	1.999018	2.000982	0.0141 %	0.0450 %	PASS 31.23 %
2.0 V AC+DC @ 1.0 kHz	2.0001609	0.0041 %	1.999018	2.000982	0.0080 %	0.0450 %	PASS 17.81 %
2.0 V AC+DC @ 6.25 kHz	2.000276	0.0041 %	1.998918	2.001082	0.0138 %	0.0500 %	PASS 27.51 %
2.0 V AC+DC @ 10.0 kHz	2.0002952	0.0041 %	1.998918	2.001082	0.0148 %	0.0500 %	PASS 29.43 %
2.0 V AC+DC @ 20.0 kHz	2.000279	0.0041 %	1.998918	2.001082	0.0139 %	0.0500 %	PASS 27.81 %
2.0 V AC+DC @ 50.0 kHz	1.9998978	0.0070 %	1.998560	2.001440	-0.0051 %	0.0650 %	PASS 7.82 %
2.0 V AC+DC @ 100.0 kHz	1.9980524	0.0115 %	1.993470	2.006530	-0.0974 %	0.3150 %	PASS 30.89 %
2.0 V AC+DC @ 200.0 kHz	1.9928399	0.0340 %	1.983820	2.016180	-0.3580 %	0.7750 %	PASS 46.15 %
2.0 V AC+DC @ 300.0 kHz	1.9895681	0.0340 %	1.983820	2.016180	-0.5216 %	0.7750 %	PASS 67.24 %

2.0 V AC+DC @ 500.0 kHz	1.9876681	0.0900 %	1.956200	2.043800	-0.6166 %	2.1000 %	PASS 29.33 %
2.0 V AC+DC @ 1.0 MHz	1.9930225	0.1500 %	1.955000	2.045000	-0.3489 %	2.1000 %	PASS 16.57 %
20 V AC+DC @ 10 Hz	20.0005	0.0220 %	19.933600	20.066400	0.0025 %	0.3100 %	PASS 0.80 %
20 V AC+DC @ 20 Hz	20.000663	0.0083 %	19.936350	20.063650	0.0033 %	0.3100 %	PASS 1.07 %
20 V AC+DC @ 50 Hz	20.000817	0.0040 %	19.961210	20.038790	0.0041 %	0.1900 %	PASS 2.15 %
20 V AC+DC @ 60 Hz	20.000998	0.0040 %	19.961210	20.038790	0.0050 %	0.1900 %	PASS 2.62 %
20 V AC+DC @ 100 Hz	20.001052	0.0040 %	19.961210	20.038790	0.0053 %	0.1900 %	PASS 2.77 %
20 V AC+DC @ 1.0 kHz	20.00038	0.0040 %	19.961210	20.038790	0.0019 %	0.1900 %	PASS 1.00 %
20 V AC+DC @ 6.25 kHz	19.996285	0.0040 %	19.953210	20.046790	-0.0186 %	0.2300 %	PASS 8.07 %
20 V AC+DC @ 10.0 kHz	19.995996	0.0040 %	19.953210	20.046790	-0.0200 %	0.2300 %	PASS 8.70 %
20 V AC+DC @ 20.0 kHz	19.996934	0.0040 %	19.953210	20.046790	-0.0153 %	0.2300 %	PASS 6.67 %
20 V AC+DC @ 50.0 kHz	20.000573	0.0070 %	19.948600	20.051400	0.0029 %	0.2500 %	PASS 1.15 %
20 V AC+DC @ 100.0 kHz	19.994803	0.0100 %	19.908000	20.092000	-0.0260 %	0.4500 %	PASS 5.77 %
20 V AC+DC @ 200.0 kHz	19.977972	0.0280 %	19.794400	20.205600	-0.1101 %	1.0000 %	PASS 11.01 %
20 V AC+DC @ 300.0 kHz	19.98884	0.0280 %	19.794400	20.205600	-0.0558 %	1.0000 %	PASS 5.58 %
20 V AC+DC @ 500.0 kHz	20.068962	0.0900 %	18.782000	21.218000	0.3448 %	6.0000 %	PASS 5.75 %
20 V AC+DC @ 1.0 MHz	20.481869	0.1400 %	18.772000	21.228000	2.4093 %	6.0000 %	PASS 40.14 %
200.0 V AC+DC @ 10 Hz	200.03984	0.0220 %	199.606000	200.394000	0.0199 %	0.1750 %	PASS 11.29 %
200.0 V AC+DC @ 20 Hz	200.03931	0.0083 %	199.633500	200.366500	0.0197 %	0.1750 %	PASS 11.22 %
200.0 V AC+DC @ 50 Hz	200.03886	0.0048 %	199.880400	200.119600	0.0194 %	0.0550 %	PASS 35.20 %
200.0 V AC+DC @ 60 Hz	200.03888	0.0048 %	199.880400	200.119600	0.0194 %	0.0550 %	PASS 35.21 %
200.0 V AC+DC @ 100 Hz	200.03639	0.0048 %	199.880400	200.119600	0.0182 %	0.0550 %	PASS 32.96 %
200.0 V AC+DC @ 1.0 kHz	200.02949	0.0048 %	199.880400	200.119600	0.0147 %	0.0550 %	PASS 26.71 %
200.0 V AC+DC @ 6.25 kHz	199.99903	0.0048 %	199.800400	200.199600	-0.0005 %	0.0950 %	PASS 0.51 %
200.0 V AC+DC @ 10.0 kHz	200.00772	0.0048 %	199.800400	200.199600	0.0039 %	0.0950 %	PASS 4.06 %
200.0 V AC+DC @ 20.0 kHz	200.03115	0.0048 %	199.800400	200.199600	0.0156 %	0.0950 %	PASS 16.37 %
200.0 V AC+DC @ 50.0 kHz	200.03462	0.0075 %	199.755000	200.245000	0.0173 %	0.1150 %	PASS 15.02 %
200.0 V AC+DC @ 100.0 kHz	199.93241	0.0133 %	199.343500	200.656500	-0.0338 %	0.3150 %	PASS 10.72 %
700.0 V AC+DC @ 50 Hz	699.9271	0.0079 %	699.234952	700.765048	-0.0104 %	0.1014 %	PASS 10.24 %
700.0 V AC+DC @ 60 Hz	699.93735	0.0079 %	699.234952	700.765048	-0.0090 %	0.1014 %	PASS 8.80 %
700.0 V AC+DC @ 100 Hz	699.9494	0.0079 %	699.234952	700.765048	-0.0072 %	0.1014 %	PASS 7.11 %
700.0 V AC+DC @ 1.0 kHz	699.81925	0.0079 %	699.234952	700.765048	-0.0258 %	0.1014 %	PASS 25.38 %
700.0 V AC+DC @ 6.25 kHz	700.11	0.0111 %	698.932650	701.067350	0.0157 %	0.1414 %	PASS 11.08 %
700.0 V AC+DC @ 10.0 kHz	700.2613	0.0111 %	698.932650	701.067350	0.0373 %	0.1414 %	PASS 26.31 %
700.0 V AC+DC @ 20.0 kHz	700.53465	0.0111 %	698.932650	701.067350	0.0764 %	0.1414 %	PASS 53.84 %

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 µADC	0	0.57 nA						INFO
1 µADC	1E-06	1.00078E-06	71.82 ppm	9.986792E-07	1.001321E-06	0.0780 %	1250 ppm	PASS 62.35 %
2 µADC	2E-06	2.00081E-06	71.82 ppm	1.998557E-06	2.001443E-06	405.000 ppm	650 ppm	PASS 61.98 %
-1 µADC	-1E-06	-9.9927E-07	71.82 ppm	-1.001323E-06	-9.986772E-07	-0.0730 %	1250 ppm	PASS 58.26 %
-2 µADC	-2E-06	-1.99926E-06	71.82 ppm	-2.001445E-06	-1.998555E-06	-370.000 ppm	650 ppm	PASS 56.54 %
Zero 00 µADC	0	0.53 nA						INFO
10 µADC	1E-05	1.0000815E-05	71.82 ppm	9.997583E-06	1.000242E-05	81.500 ppm	170 ppm	PASS 44.18 %
20 µADC	2E-05	2.0000855E-05	71.82 ppm	1.999636E-05	2.000364E-05	42.750 ppm	110 ppm	PASS 32.55 %
-10 µADC	-1E-05	-9.999625E-06	71.82 ppm	-1.000242E-05	-9.997581E-06	-37.500 ppm	170 ppm	PASS 20.31 %
20 µADC	-2E-05	-1.9999825E-05	71.82 ppm	-2.000364E-05	-1.999636E-05	-8.750 ppm	110 ppm	PASS 6.66 %
Zero 000 µADC	0	0.35 nA						INFO
100 µADC	0.0001	0.00010000135	71.82 ppm	9.998662E-05	0.0001000134	13.500 ppm	62 ppm	PASS 14.23 %
200 µADC	0.0002	0.00020000183	71.82 ppm	0.0001999744	0.0002000256	9.125 ppm	56 ppm	PASS 10.02 %
-100 µADC	-0.0001	-0.0001000018	71.82 ppm	-0.0001000134	-9.998662E-05	18.000 ppm	62 ppm	PASS 18.97 %
-200 µADC	-0.0002	-0.00020000438	71.82 ppm	-0.0002000256	-0.0001999744	21.875 ppm	56 ppm	PASS 24.02 %
Zero mADC	0	0.34 nA						INFO
-1.0 mADC	0.001	0.0010000094	33.64 ppm	0.0009999064	0.001000094	9.400 ppm	60 ppm	PASS 13.67 %
2.0 mADC	0.002	0.0020000119	33.64 ppm	0.001999823	0.002000177	5.950 ppm	55 ppm	PASS 9.23 %
-1.0 mADC	-0.001	-0.0010000185	33.64 ppm	-0.001000094	-0.0009999064	18.500 ppm	60 ppm	PASS 26.89 %
-2.0 mADC	-0.002	-0.0020000429	33.64 ppm	-0.002000177	-0.001999823	21.450 ppm	55 ppm	PASS 33.27 %
Zero 00 mADC	0	0.32 nA						INFO
10 mADC	0.01	0.00999997	32.27 ppm	0.009999077	0.01000092	-3.000 ppm	60 ppm	PASS 4.40 %
20 mADC	0.02	0.019999884	32.27 ppm	0.01999825	0.02000175	-5.800 ppm	55 ppm	PASS 9.10 %
-10 mADC	-0.01	-0.010000049	32.27 ppm	-0.01000092	-0.009999077	4.900 ppm	60 ppm	PASS 7.19 %
-20 mADC	-0.02	-0.020000147	32.27 ppm	-0.02000175	-0.01999825	7.375 ppm	55 ppm	PASS 11.57 %
Zero 000 mADC	0	0.26 nA						INFO
100 mADC	0.1	0.09999866	53.32 ppm	0.09998617	0.1000138	-13.400 ppm	85 ppm	PASS 13.35 %
200 mADC	0.2	0.20000236	53.32 ppm	0.1999733	0.2000267	11.800 ppm	80 ppm	PASS 12.27 %
-100 mADC	-0.1	-0.09999989	53.32 ppm	-0.1000138	-0.09998617	-1.100 ppm	85 ppm	PASS 1.10 %
-200 mADC	-0.2	-0.20000488	53.32 ppm	-0.2000267	-0.1999733	24.400 ppm	80 ppm	PASS 25.38 %
Zero ADC	0	0.41 nA						INFO
1.0 ADC	1	0.9999658	115.22 ppm	0.9995248	1.000475	-34.200 ppm	360 ppm	PASS 9.05 %
2.0 ADC	2	1.9999744	115.22 ppm	1.99906	2.00094	-12.800 ppm	355 ppm	PASS 3.43 %
-1.0 ADC	-1	-1.0000516	115.22 ppm	-1.000475	-0.9995248	51.600 ppm	360 ppm	PASS 13.65 %
-2.0 ADC	-2	-1.9998506	115.22 ppm	-2.00094	-1.99906	-74.725 ppm	355 ppm	PASS 20.02 %

Procedure for all test points that verify Gain of the AC Current ACI function. Three frequency band points are tested, 50 Hz, 60 Hz and 1 kHz. 2-wire connection at LO and DCI is used between DMM and MFC.

ACI Test	200µA-2A	DUT	Source unc.	Low Limit	Hi limit	Measured	24h spec	Result, % spec
1.0 mA AC @ 50 Hz	0.001	0.0009995551	0.0138 %	0.00099924182	0.00100075818	-444.900 ppm	0.0620 %	PASS 70.04 %
2.0 mA AC @ 50 Hz	0.002	0.0019996162	0.0138 %	0.00199850364	0.00200149636	-191.900 ppm	0.0610 %	PASS 30.68 %
10 mA AC @ 50 Hz	0.01	0.009996039	0.0138 %	0.0099924182	0.0100075818	-396.100 ppm	0.0620 %	PASS 62.36 %
20 mA AC @ 50 Hz	0.02	0.019997128	0.0138 %	0.0199850364	0.0200149636	-143.600 ppm	0.0610 %	PASS 22.96 %
100 mA AC @ 50 Hz	0.1	0.1000056	0.0134 %	0.099924636	0.100075364	56.000 ppm	0.0620 %	PASS 8.83 %
200 mA AC @ 50 Hz	0.2	0.20006456	0.0134 %	0.199851272	0.200148728	322.800 ppm	0.0610 %	PASS 51.69 %
1.0 A AC @ 50 Hz	1.0	0.9996189	0.0308 %	0.99887182	1.00112818	-381.100 ppm	0.0820 %	PASS 43.50 %
2.0 A AC @ 50 Hz	2.0	1.9997786	0.0308 %	1.99776364	2.00223636	-110.700 ppm	0.0810 %	PASS 12.77 %
1.0 mA AC @ 60 Hz	0.001	0.0009996421	0.0138 %	0.00099924182	0.00100075818	-357.900 ppm	0.0620 %	PASS 56.34 %
2.0 mA AC @ 60 Hz	0.002	0.0019997602	0.0138 %	0.00199850364	0.00200149636	-119.900 ppm	0.0610 %	PASS 19.17 %
10 mA AC @ 60 Hz	0.01	0.009996543	0.0138 %	0.0099924182	0.0100075818	-345.700 ppm	0.0620 %	PASS 54.42 %
20 mA AC @ 60 Hz	0.02	0.019998261	0.0138 %	0.0199850364	0.0200149636	-86.950 ppm	0.0610 %	PASS 13.90 %
100 mA AC @ 60 Hz	0.1	0.1000094	0.0134 %	0.099924636	0.100075364	94.000 ppm	0.0620 %	PASS 14.82 %
200 mA AC @ 60 Hz	0.2	0.20007926	0.0134 %	0.199851272	0.200148728	396.300 ppm	0.0610 %	PASS 63.46 %
1.0 A AC @ 60 Hz	1.0	0.9996493	0.0308 %	0.99887182	1.00112818	-350.700 ppm	0.0820 %	PASS 40.03 %
2.0 A AC @ 60 Hz	2.0	1.9998331	0.0308 %	1.99776364	2.00223636	-83.450 ppm	0.0810 %	PASS 9.63 %
1.0 mA AC @ 1.0 kHz	0.001	0.0009997238	0.0138 %	0.00099954182	0.00100045818	-276.200 ppm	0.0320 %	PASS 79.24 %
2.0 mA AC @ 1.0 kHz	0.002	0.0019999536	0.0138 %	0.00199910364	0.00200089636	-23.200 ppm	0.0310 %	PASS 6.84 %
10 mA AC @ 1.0 kHz	0.01	0.009998264	0.0138 %	0.0099954182	0.0100045818	-173.600 ppm	0.0320 %	PASS 49.80 %
20 mA AC @ 1.0 kHz	0.02	0.020001594	0.0138 %	0.0199910364	0.0200089636	79.700 ppm	0.0310 %	PASS 23.48 %
100 mA AC @ 1.0 kHz	0.1	0.10002821	133.64	0.099954636	0.100045364	282.100 ppm	0.0320 %	PASS 81.35 %
1.0 A AC @ 1.0 kHz	1.0	0.9998228	0.0308 %	0.99867182	1.00132818	-0.0177 %	0.1020 %	PASS 16.63 %
2.0 A AC @ 1.0 kHz	2.0	2.0000937	0.0308 %	1.99736364	2.00263636	0.0047 %	0.1010 %	PASS 4.44 %
200 µA AC @ 10.0 kHz	0.0002	0.0001998888	0.1400 %	0.00019972	0.00020028	-556.000 ppm	0.0000 %	PASS 39.71 %
1.0 mA AC @ 10.0 kHz	0.001	0.0010000254	0.1400 %	0.00099798	0.00100202	25.400 ppm	0.0620 %	PASS 1.66 %
2.0 mA AC @ 10.0 kHz	0.002	0.0020003225	0.1400 %	0.00199598	0.00200402	161.250 ppm	0.0610 %	PASS 10.56 %
10 mA AC @ 10.0 kHz	0.01	0.009999624	0.1300 %	0.0099808	0.0100192	-37.600 ppm	0.0620 %	PASS 2.61 %
20 mA AC @ 10.0 kHz	0.02	0.020001835	0.1300 %	0.0199618	0.0200382	91.750 ppm	0.0610 %	PASS 6.39 %
100 mA AC @ 10.0 kHz	0.1	0.1000741	0.1100 %	0.099828	0.100172	741.000 ppm	0.0620 %	PASS 58.68 %
200 mA AC @ 10.0 kHz	0.2	0.20017394	0.1100 %	0.199658	0.200342	869.700 ppm	0.0610 %	PASS 69.14 %
1.0 A AC @ 10.0 kHz	1.0	0.9968154	0.6100 %	0.99088	1.00912	-0.3185 %	0.3020 %	PASS 46.79 %
2.0 A AC @ 10.0 kHz	2.0	1.9910103	0.6100 %	1.98178	2.01822	-0.4495 %	0.3010 %	PASS 66.08 %

Test date	16 March 2021 23:42
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Lab temperature maintained +23°C ±1°C

Internal use only