TRANSMILLE
ADVANCED METROLOGY SYSTEMS

CERTIFICATE OF CALIBRATION

Issued By :
Transmille Calibration, Inc
158 Brentwood Drive
Unit #4
Colchester VT 05446

P: 802 846 7582
www.transmillecalibration.com

Certificate Number AC-25503
Date of Issue: 2/3/2020

Approved Signatory

Scott Sabourin

D. Bartlett ☐ G. Viens ☐ S. Sabourin ☑

Customer :

Instrument :

System ID :	ID01799
Description :	Multi-Product Calibrator
Manufacturer :	Transmille
Model Number :	3050A
Serial Number :	

Calibration Info:

Date Received :	01/29/2020
Job Number :	J10544-1
Order Number :	S317611
Procedure Number :	537
Procedure Version :	20-1.0/N

Environmental Conditions

Temperature :	23°C ± 1°C
Relative Humidity :	24%RH ± 10%RH
Mains Voltage :	120V ± 10V
Mains Frequency :	60Hz ± 1Hz

Comments

This certificate is issued in compliance with ISO/IEC 17025:2017 and our ANAB accredited quality system. Reported measurement uncertainties are stated with a coverage factor *k*=2, corresponding to a coverage probability of 95%
Instrument was allowed to stabilise for at least 12 hours before calibration.
4 Wire kelvin connections were used for ohms measurements below 10kOhms

Traceability Information

Instrument Description	Serial Number	Certificate Number	Cal. Date	Period [Weeks]
4010 Advanced Multi-Product Calibrator	Y1204J15	38520	5/11/19	52
8091 Multimeter	J1165A13	38423	4/11/19	52
LCR Bridge	EL222001	1883457	5/17/19	52
8600 Frequency Reference	111178F14	38693	5/13/19	52

Calibrated By : Don Bartlett Date of Calibration : 2/3/2020

This certificate provides traceability of measurement to recognized National standards, through units of measurement realized at the National Physical Laboratory (NPL), National Institute of Standards & Technology (NIST) or other recognized National standards laboratories to the International System of Units. Copyright of this certificate is owned by the issuing laboratory and may not be reproduced except in full, without the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

AS FOUND RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
Firmware Version: 12.2.4				
DC Voltage				
200mV Range	0.0000mV	± 4uV	0.0005mV	± 0.8uV
200mV Range	100.0000mV	± 9uV	99.9999mV	± 1.1uV
200mV Range	200.0000mV	± 14uV	199.9998mV	± 1.9uV
200mV Range	-100.0000mV	± 9uV	-99.9952mV	± 1.1uV
200mV Range	-200.0000mV	± 14uV	-199.9920mV	± 1.9uV
2V Range	0.2200000V	± 46uV	0.2200030V	± 1.9uV
2V Range	1.0000000V	± 85uV	1.0000185V	± 5.6uV
2V Range	2.0000000V	± 135uV	2.0000280V	± 18.1uV
2V Range	-0.2200000V	± 46uV	-0.2199946V	± 1.9uV
2V Range	-1.0000000V	± 85uV	-0.9999833V	± 5.6uV
2V Range	-2.0000000V	± 135uV	-1.9999560V	± 18.1uV
20V Range	2.200000V	± 410uV	2.200026V	± 19.2uV
20V Range	10.000000V	± 800uV	10.000183V	± 60.5uV
20V Range	20.000000V	± 1.3mV	20.000390V	± 0.2mV
20V Range	-2.200000V	± 410uV	-2.199998V	± 19.2uV
20V Range	-10.000000V	± 800uV	-10.000079V	± 60.5uV
20V Range	-20.000000V	± 1.3mV	-20.000010V	± 0.2uV
200V Range	100.00000V	± 8mV	99.99787V	± 0.8mV
200V Range	200.00000V	± 13mV	199.99730V	± 2.8mV
200V Range	-200.00000V	± 13mV	-199.99140V	± 2.8mV
200V Range	-100.00000V	± 8mV	-99.99542V	± 0.8mV
1kV Range	220.0000V	± 31mV	220.0000V	± 3mV
1kV Range	1000.0000V	± 70mV	999.9942V	± 8.6mV
1kV Range	-1000.0000V	± 70mV	-999.9667V	± 8.6mV
1kV Range	-220.0000V	± 31mV	-219.9933V	± 3mV
AC Voltage Output Frequency Tests				
10kHz at 2V	10.00000kHz	± 1.3Hz	10.00000kHz	± 0.01Hz
100kHz at 2V	100.0000kHz	± 13Hz	100.0000kHz	± 0.1Hz
AC Voltage				
200mV A.C. : 40Hz	20.000mV	± 59uV	19.999mV	± 12.2uV
200mV A.C. : 206Hz	20.000mV	± 32uV	20.000mV	± 12.2uV
200mV A.C. : 20kHz	20.000mV	± 210uV	19.943mV	± 16.8uV
200mV A.C. : 10Hz	200.000mV	± 330uV	200.004mV	± 156.6uV
200mV A.C. : 40Hz	200.000mV	± 330uV	199.978mV	± 70.7uV
200mV A.C. : 56Hz	200.000mV	± 95uV	199.997mV	± 26.8uV
200mV A.C. : 206Hz	200.000mV	± 95uV	199.991mV	± 26.8uV

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AS FOUND RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
200mV A.C. : 1kHz	200.000mV	± 95uV	200.004mV	± 26.8uV
200mV A.C. : 10kHz	200.000mV	± 390uV	200.022mV	± 34uV
200mV A.C. : 20kHz	200.000mV	± 390uV	200.064mV	± 34uV
2V Range : 40Hz	0.21000V	± 406uV	0.20996V	± 73.9uV
2V Range : 206Hz	0.21000V	± 293.5uV	0.20998V	± 27.8uV
2V Range : 100kHz	0.21000V	± 3.4mV	0.21009V	± 0.1mV
2V Range. : 206Hz	1.00000V	± 570uV	1.00022V	± 125uV
2V Range : 206Hz	1.50000V	± 745uV	1.50022V	± 172.5uV
2V Range : 10Hz	2.00000V	± 1.5mV	1.99996V	± 0.6mV
2V Range : 40Hz	2.00000V	± 1.5mV	1.99982V	± 0.2mV
2V Range : 56Hz	2.00000V	± 920uV	1.99995V	± 215uV
2V Range : 206Hz	2.00000V	± 920uV	2.00005V	± 215uV
2V Range: 1kHz	2.00000V	± 920uV	2.00020V	± 215uV
2V Range : 5kHz	2.00000V	± 1.6mV	1.99993V	± 2.1mV
2V Range : 10kHz	2.00000V	± 1.6mV	1.99984V	± 2.1mV
2V Range : 20kHz	2.00000V	± 7mV	2.00065V	± 0.7mV
2V Range : 50kHz	2.00000V	± 7mV	1.99998V	± 0.7mV
2V Range : 100kHz	2.00000V	± 7mV	1.99955V	± 0.7mV
20V Range : 40Hz	2.1000V	± 4.1mV	2.0997V	± 0.2mV
20V Range : 206Hz	2.1000V	± 2.9mV	2.1000V	± 0.2mV
20V Range : 100kHz	2.1000V	± 36.3mV	2.1001V	± 0.7mV
20V Range : 206Hz	10.0000V	± 5.7mV	10.0017V	± 1.2mV
20V Range : 206Hz	15.0000V	± 7.4mV	15.0013V	± 1.6mV
20V Range : 10Hz	20.0000V	± 14.8mV	20.0006V	± 6.2mV
20V Range : 40Hz	20.0000V	± 14.8mV	19.9980V	± 2mV
20V Range : 56Hz	20.0000V	± 9.2mV	19.9991V	± 2mV
20V Range : 206Hz	20.0000V	± 9.2mV	20.0003V	± 2mV
20V Range : 1kHz	20.0000V	± 9.2mV	19.9998V	± 2mV
20V Range : 5kHz	20.0000V	± 17.9mV	20.0026V	± 2.5mV
20V Range : 10kHz	20.0000V	± 17.9mV	20.0007V	± 2.5mV
20V Range : 20kHz	20.0000V	± 90mV	20.0092V	± 2.5mV
20V Range : 100kHz	20.0000V	± 90mV	20.0012V	± 6.3mV
200V Range : 40Hz	21.000V	± 31.4mV	21.003V	± 2.1mV
200V Range : 206Hz	21.000V	± 31.4mV	21.003V	± 2.1mV
200V Range : 20kHz	21.000V	± 57.9mV	21.019V	± 2.6mV
200V Range : 206Hz	100.000V	± 67mV	100.022V	± 12.6mV
200V Range : 40Hz	200.000V	± 112mV	200.008V	± 20.2mV
200V Range : 56Hz	200.000V	± 112mV	200.009V	± 20.2mV
200V Range : 206Hz	200.000V	± 112mV	200.003V	± 20.2mV
200V Range : 1000Hz	200.000V	± 112mV	199.994V	± 20.2mV

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AS FOUND RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
200V Range : 10kHz	200.000V	± 219mV	200.030V	± 78.2mV
200V Range : 20kHz	200.000V	± 219mV	200.126V	± 138mV
1kV Range : 40Hz	210.000V	± 214.5mV	210.067V	± 21mV
1kV Range : 206Hz	210.000V	± 214.5mV	210.080V	± 21mV
1kV Range : 10kHz	210.000V	± 479mV	210.069V	± 79mV
1kV Range : 40Hz	700.000V	± 435mV	700.076V	± 86.1mV
1kV Range : 56Hz	700.000V	± 435mV	700.248V	± 86.1mV
1kV Range : 1kHz	700.000V	± 435mV	700.082V	± 86.1mV
1kV Range : 5kHz	700.000V	± 920mV	700.095V	± 121mV
1kV Range : 10kHz	700.000V	± 920mV	700.124V	± 121mV
1kV Range : 56Hz	1000.000V	± 675mV	1000.208V	± 114mV
1kV Range : 1KHz	1000.000V	± 675mV	999.965V	± 114mV
Linearity - 20V DC Range				
Linearity	19.000000V	± 1.3mV	19.000210V	± 0.23mV
Linearity	18.000000V	± 1.2mV	18.000200V	± 0.22mV
Linearity	17.000000V	± 1.2mV	17.000250V	± 0.22mV
Linearity	16.000000V	± 1.1mV	16.000200V	± 0.21mV
Linearity	15.000000V	± 1.1mV	15.000240V	± 0.2mV
Linearity	14.000000V	± 1mV	14.000140V	± 0.2mV
Linearity	13.000000V	± 950uV	13.000210V	± 187.9uV
Linearity	12.000000V	± 900uV	12.000140V	± 180.6uV
Linearity	11.000000V	± 850uV	11.000110V	± 173.3uV
Linearity	9.000000V	± 750uV	9.000055V	± 55.2uV
Linearity	8.000000V	± 700uV	8.000076V	± 49.9uV
Linearity	7.000000V	± 650uV	7.000024V	± 44.6uV
Linearity	6.000000V	± 600uV	6.000032V	± 39.3uV
Linearity	5.000000V	± 550uV	5.000047V	± 34uV
Linearity	4.000000V	± 500uV	3.999999V	± 28.7uV
Linearity	3.000000V	± 450uV	3.000010V	± 23.4uV
Linearity	2.100000V	± 405uV	2.099961V	± 18.6uV
Linearity	-19.000000V	± 1.3mV	-18.999710V	± 0.23mV
Linearity	-18.000000V	± 1.2mV	-17.999810V	± 0.22mV
Linearity	-17.000000V	± 1.2mV	-16.999810V	± 0.22mV
Linearity	-16.000000V	± 1.1mV	-15.999750V	± 0.21mV
Linearity	-15.000000V	± 1.1mV	-14.999840V	± 0.2mV
Linearity	-14.000000V	± 1mV	-13.999800V	± 0.2mV
Linearity	-13.000000V	± 950uV	-12.999820V	± 187.9uV
Linearity	-12.000000V	± 900uV	-11.999830V	± 180.6uV
Linearity	-11.000000V	± 850uV	-10.999850V	± 173.3uV
Linearity	-9.000000V	± 750uV	-8.999863V	± 55.2uV

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AS FOUND RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
Linearity	-8.000000V	± 700uV	-7.999908V	± 49.9uV
Linearity	-7.000000V	± 650uV	-6.999884V	± 44.6uV
Linearity	-6.000000V	± 600uV	-5.999915V	± 39.3uV
Linearity	-5.000000V	± 550uV	-4.999961V	± 34uV
Linearity	-4.000000V	± 500uV	-3.999931V	± 28.7uV
Linearity	-3.000000V	± 450uV	-2.999957V	± 23.4uV
Linearity	-2.100000V	± 405uV	-2.099928V	± 18.6uV
DC Current				
200uA Range	0.0000uA	± 20nA	0.0001uA	± 13pA
200uA Range	100.0000uA	± 32nA	99.9971uA	± 1.4nA
200uA Range	200.0000uA	± 44nA	199.9888uA	± 6.5nA
200uA Range	-100.0000uA	± 32nA	-99.9975uA	± 1.4nA
200uA Range	-200.0000uA	± 44nA	-199.9902uA	± 6.5nA
2mA Range	0.210000mA	± 101nA	0.210001mA	± 6.6nA
2mA Range	1.000000mA	± 180nA	1.000024mA	± 13.8nA
2mA Range	2.000000mA	± 280nA	2.000017mA	± 73nA
2mA Range	-1.000000mA	± 180nA	-1.000016mA	± 13.8nA
2mA Range	-2.000000mA	± 280nA	-2.000013mA	± 73nA
20mA Range	5.00000mA	± 1.3uA	4.99992mA	± 0.1uA
20mA Range	10.00000mA	± 1.8uA	9.99984mA	± 0.2uA
20mA Range	15.00000mA	± 2.3uA	14.99950mA	± 1.2uA
20mA Range	20.00000mA	± 2.8uA	19.99929mA	± 1.4uA
20mA Range	-5.00000mA	± 1.3uA	-4.99999mA	± 0.1uA
20mA Range	-10.00000mA	± 1.8uA	-10.00002mA	± 0.2uA
20mA Range	-15.00000mA	± 2.3uA	-14.99980mA	± 1.2uA
20mA Range	-20.00000mA	± 2.8uA	-19.99971mA	± 1.4uA
200mA Range	100.0000mA	± 20uA	99.9977mA	± 4.2uA
200mA Range	200.0000mA	± 32uA	200.0001mA	± 49uA
200mA Range	-100.0000mA	± 20uA	-100.0001mA	± 4.2uA
200mA Range	-200.0000mA	± 32uA	-200.0068mA	± 49uA
2A Range	1.000000A	± 590uA	1.000078A	± 185uA
2A Range	2.000000A	± 1.1mA	2.000170A	± 0.4mA
2A Range	-1.000000A	± 590uA	-1.000099A	± 185uA
2A Range	-2.000000A	± 1.1mA	-2.000236A	± 0.4mA
22A Range	11.00000A	± 6.4mA	11.00170A	± 3.5mA
22A Range	22.00000A	± 11.9mA	22.00344A	± 6.6mA
22A Range	-22.00000A	± 11.9mA	-22.00559A	± 6.6mA
22A Range	-11.00000A	± 6.4mA	-11.00337A	± 3.5mA

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AS FOUND RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
AC Current				
200uA Rng: 40Hz	25.000uA	± 422.5nA	24.983uA	± 132nA
200uA Rng: 206Hz	25.000uA	± 317.5nA	24.978uA	± 132nA
200uA Rng: 10kHz	25.000uA	± 525nA	24.969uA	± 205nA
200uA Rng: 10Hz	200.000uA	± 580nA	200.128uA	± 276nA
200uA Rng: 40Hz	200.000uA	± 580nA	200.128uA	± 158nA
200uA Rng: 56hz	200.000uA	± 440nA	200.071uA	± 158nA
200uA Rng: 1kHz	200.000uA	± 440nA	200.078uA	± 14958nA
200uA Rng: 10kHz	200.000uA	± 700nA	200.018uA	± 730nA
2mA Rng: 40Hz	0.21000mA	± 789nA	0.21004mA	± 161nA
2mA Rng: 206Hz	0.21000mA	± 547nA	0.21005mA	± 161nA
2mA Rng: 10kHz	0.21000mA	± 910nA	0.20994mA	± 564nA
2mA Rng: 10Hz	2.00000mA	± 2.4uA	2.00095mA	± 1.4uA
2mA Rng: 40Hz	2.00000mA	± 2.4uA	2.00066mA	± 0.6uA
2mA Rng: 56Hz	2.00000mA	± 1.8uA	2.00087mA	± 0.6uA
2mA Rng: 1kHz	2.00000mA	± 1.8uA	2.00057mA	± 0.6uA
2mA Rng: 10kHz	2.00000mA	± 2.6uA	2.00052mA	± 3.3uA
20mA Rng: 40Hz	2.1000mA	± 5.9uA	2.1008mA	± 0.6uA
20mA Rng: 206Hz	2.1000mA	± 4.5uA	2.1010mA	± 0.6uA
20mA Rng: 10kHz	2.1000mA	± 8.1uA	2.1009mA	± 3.4uA
20mA Rng: 56Hz	10.0000mA	± 10uA	10.0091mA	± 2.4uA
20mA Rng: 10Hz	20.0000mA	± 22uA	20.0147mA	± 15.3uA
20mA Rng: 40Hz	20.0000mA	± 22uA	20.0119mA	± 5.3uA
20mA Rng: 1kHz	20.0000mA	± 17uA	20.0109mA	± 5.3uA
20mA Rng: 10kHz	20.0000mA	± 26uA	20.0000mA	± 16uA
200mA Rng: 40Hz	21.000mA	± 58.9uA	21.008mA	± 5.5uA
200mA Rng: 206Hz	21.000mA	± 44.7uA	21.011mA	± 5.5uA
200mA Rng: 10kHz	21.000mA	± 81uA	21.018mA	± 17uA
200mA Rng: 10Hz	200.000mA	± 220uA	200.195mA	± 139uA
200mA Rng: 40Hz	200.000mA	± 220uA	200.178mA	± 55uA
200mA Rng: 56Hz	200.000mA	± 170uA	200.181mA	± 55uA
200mA Rng: 1kHz	200.000mA	± 170uA	200.219mA	± 55uA
200mA Rng: 10kHz	200.000mA	± 260uA	200.255mA	± 322uA
2A Rng: 40Hz	0.21000A	± 660uA	0.20986A	± 56.6uA
2A Rng: 206Hz	0.21000A	± 589uA	0.20984A	± 56.6uA
2A Rng: 2kHz	0.21000A	± 589uA	0.20979A	± 56.6uA
2A Rng: 10Hz	2.00000A	± 2.4mA	2.00020A	± 1.5mA
2A Rng: 40Hz	2.00000A	± 2.4mA	2.00041A	± 0.9mA
2A Rng: 56Hz	2.00000A	± 2.2mA	2.00016A	± 0.9mA

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AS FOUND RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
2A Rng: 1kHz	2.00000A	± 2.2mA	2.00026A	± 0.9mA
2A Rng: 2kHz	2.00000A	± 2.2mA	1.99963A	± 3.4mA
22A Rng: 40Hz	2.10000A	± 13.2mA	2.09949A	± 1mA
22A Rng: 206Hz	2.10000A	± 9.2mA	2.09802A	± 1mA
22A Rng: 10Hz	22.00000A	± 53mA	22.00530A	± 15.5mA
22A Rng: 40Hz	22.00000A	± 53mA	22.01080A	± 15.5mA
22A Rng: 56Hz	22.00000A	± 39mA	22.00940A	± 34.6mA
22A Rng: 100Hz	22.00000A	± 39mA	22.00750A	± 34.6mA
22A Rng: 1kHz	22.00000A	± 52mA	22.00590A	± 34.6mA

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AS FOUND RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
2 Wire Resistance measured as value at terminals.				
100MR 2 Wire	100.0230MΩ	± 500kΩ	100.0460MΩ	± 17.7kΩ
0R 2 Wire	0.1900Ω	± 55mΩ	0.2179Ω	± 9uΩ
10R 2 Wire	10.196Ω	± 60mΩ	10.219Ω	± 0.2mΩ
100R 2 Wire	100.199Ω	± 63mΩ	100.224Ω	± 1.3mΩ
1kR 2 Wire	1.000211kΩ	± 95mΩ	1.000240kΩ	± 11.7mΩ
10kR 2 Wire	10.00030kΩ	± 555mΩ	9.98831kΩ	± 132mΩ
100kR 2 Wire	100.0051kΩ	± 5Ω	99.4515kΩ	± 1.4Ω
1MR 2 Wire	0.999927MΩ	± 100Ω	0.890446MΩ	± 16.7Ω
10MR 2 Wire	10.00386MΩ	± 5kΩ	10.00295MΩ	± 0.3kΩ
4 Wire Ohms Measured relative to Zero				
10R 4 Wire	10.006094Ω	± 25mΩ	10.006490Ω	± 0.12mΩ
100R 4 Wire	99.99423Ω	± 28mΩ	99.99210Ω	± 1.3mΩ
1kR 4 Wire	1.0000000kΩ	± 70mΩ	1.0000045kΩ	± 11.7mΩ
10kR 4 Wire	10.000082kΩ	± 520mΩ	10.000190kΩ	± 0.1mΩ
100kR 4 Wire	100.00510kΩ	± 5Ω	100.00640kΩ	± 1.4Ω
Capacitance @ 1kHz Measured Cp up to 1uF, Cs above				
10nF	10.059nF	± 60pF	10.058nF	± 6pF
20nF	19.959nF	± 100pF	19.955nF	± 12pF
50nF	49.482nF	± 220pF	49.484nF	± 30pF
100nF	99.22nF	± 420pF	99.17nF	± 60pF
1uF	1.0002uF	± 6nF	1.0000uF	± 0.6nF
Reference Frequency Output				
Frequency	10.000000MHz	± 130Hz	9.999977MHz	± 2Hz
Frequency	1.0000000MHz	± 12.1Hz	0.9999972MHz	± 0.2Hz
Frequency	100.00000kHz	± 2.2Hz	99.99972kHz	± 0.02Hz
Frequency	50.000000kHz	± 700mHz	49.999862kHz	± 0.01Hz
Frequency	20.000000kHz	± 340mHz	19.999945kHz	± 0.004Hz
Frequency	10.000000kHz	± 130mHz	9.999973kHz	± 2mHz
Frequency	1.0000000kHz	± 12.1mHz	0.9999971kHz	± 0.2mHz
Frequency	100.00000Hz	± 2.2mHz	99.99973Hz	± 0.02mHz

End Of Results

CERTIFICATE OF CALIBRATION

AFTER ADJUSTMENT RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
Firmware Version: 12.2.4				
DC Voltage				
200mV Range	0.0000mV	± 4uV	0.0005mV	±0.8uV
200mV Range	100.0000mV	± 9uV	99.9999mV	±1.1uV
200mV Range	200.0000mV	± 14uV	199.9998mV	±1.9uV
200mV Range	-100.0000mV	± 9uV	-99.9952mV	±1.1uV
200mV Range	-200.0000mV	± 14uV	-199.9920mV	±1.9uV
2V Range	0.2200000V	± 46uV	0.2200030V	±1.9uV
2V Range	1.0000000V	± 85uV	1.0000185V	±5.6uV
2V Range	2.0000000V	± 135uV	2.0000280V	±18.1uV
2V Range	-0.2200000V	± 46uV	-0.2199946V	±1.9uV
2V Range	-1.0000000V	± 85uV	-0.9999833V	±5.6uV
2V Range	-2.0000000V	± 135uV	-1.9999560V	±18.1uV
20V Range	2.200000V	± 410uV	2.200026V	±19.2uV
20V Range	10.000000V	± 800uV	10.000183V	±60.5uV
20V Range	20.000000V	± 1.3mV	20.000390V	±0.2mV
20V Range	-2.200000V	± 410uV	-2.199998V	±19.2uV
20V Range	-10.000000V	± 800uV	-10.000079V	±60.5uV
20V Range	-20.000000V	± 1.3mV	-20.000010V	±0.2uV
200V Range	100.00000V	± 8mV	99.99787V	±0.8mV
200V Range	200.00000V	± 13mV	199.99730V	±2.8mV
200V Range	-200.00000V	± 13mV	-199.99140V	±2.8mV
200V Range	-100.00000V	± 8mV	-99.99542V	±0.8mV
1kV Range	220.0000V	± 31mV	220.0000V	±3mV
1kV Range	1000.0000V	± 70mV	999.9942V	±8.6mV
1kV Range	-1000.0000V	± 70mV	-999.9667V	±8.6mV
1kV Range	-220.0000V	± 31mV	-219.9933V	±3mV
AC Voltage Output Frequency Tests				
10kHz at 2V	10.00000kHz	± 1.3Hz	10.00000kHz	±0.01Hz
100kHz at 2V	100.0000kHz	± 13Hz	100.0000kHz	±0.1Hz
AC Voltage				
200mV A.C. : 40Hz	20.000mV	± 59uV	19.999mV	±12.2uV
200mV A.C. : 206Hz	20.000mV	± 32uV	20.000mV	±12.2uV
200mV A.C. : 20kHz	20.000mV	± 210uV	19.943mV	±16.8uV
200mV A.C. : 10Hz	200.000mV	± 330uV	200.004mV	±156.6uV
200mV A.C. : 40Hz	200.000mV	± 330uV	199.978mV	±70.7uV
200mV A.C. : 56Hz	200.000mV	± 95uV	199.997mV	±26.8uV
200mV A.C. : 206Hz	200.000mV	± 95uV	199.991mV	±26.8uV
200mV A.C. : 1kHz	200.000mV	± 95uV	200.004mV	±26.8uV

CERTIFICATE OF CALIBRATION

AFTER ADJUSTMENT RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
200mV A.C. : 10kHz	200.000mV	± 390uV	200.022mV	±34uV
200mV A.C. : 20kHz	200.000mV	± 390uV	200.064mV	±34uV
2V Range : 40Hz	0.21000V	± 406uV	0.20996V	±73.9uV
2V Range : 206Hz	0.21000V	± 293.5uV	0.20998V	±27.8uV
2V Range : 100kHz	0.21000V	± 3.4mV	0.21009V	±0.1mV
2V Range. : 206Hz	1.00000V	± 570uV	1.00022V	±125uV
2V Range : 206Hz	1.50000V	± 745uV	1.50022V	±172.5uV
2V Range : 10Hz	2.00000V	± 1.5mV	1.99996V	±0.6mV
2V Range : 40Hz	2.00000V	± 1.5mV	1.99982V	±0.2mV
2V Range : 56Hz	2.00000V	± 920uV	1.99995V	±215uV
2V Range : 206Hz	2.00000V	± 920uV	2.00005V	±215uV
2V Range: 1kHz	2.00000V	± 920uV	2.00020V	±215uV
2V Range : 5kHz	2.00000V	± 1.6mV	1.99993V	±2.1mV
2V Range : 10kHz	2.00000V	± 1.6mV	1.99984V	±2.1mV
2V Range : 20kHz	2.00000V	± 7mV	2.00065V	±0.7mV
2V Range : 50kHz	2.00000V	± 7mV	1.99998V	±0.7mV
2V Range : 100kHz	2.00000V	± 7mV	1.99955V	±0.7mV
20V Range : 40Hz	2.1000V	± 4.1mV	2.0997V	±0.2mV
20V Range : 206Hz	2.1000V	± 2.9mV	2.1000V	±0.2mV
20V Range : 100kHz	2.1000V	± 36.3mV	2.1001V	±0.7mV
20V Range : 206Hz	10.0000V	± 5.7mV	10.0017V	±1.2mV
20V Range : 206Hz	15.0000V	± 7.4mV	15.0013V	±1.6mV
20V Range : 10Hz	20.0000V	± 14.8mV	20.0006V	±6.2mV
20V Range : 40Hz	20.0000V	± 14.8mV	19.9980V	±2mV
20V Range : 56Hz	20.0000V	± 9.2mV	19.9991V	±2mV
20V Range : 206Hz	20.0000V	± 9.2mV	20.0003V	±2mV
20V Range : 1kHz	20.0000V	± 9.2mV	19.9998V	±2mV
20V Range : 5kHz	20.0000V	± 17.9mV	20.0026V	±2.5mV
20V Range : 10kHz	20.0000V	± 17.9mV	20.0007V	±2.5mV
20V Range : 20kHz	20.0000V	± 90mV	20.0092V	±2.5mV
20V Range : 100kHz	20.0000V	± 90mV	20.0012V	±6.3mV
200V Range : 40Hz	21.000V	± 31.4mV	21.003V	±2.1mV
200V Range : 206Hz	21.000V	± 31.4mV	21.003V	±2.1mV
200V Range : 20kHz	21.000V	± 57.9mV	21.019V	±2.6mV
200V Range : 206Hz	100.000V	± 67mV	100.022V	±12.6mV
200V Range : 40Hz	200.000V	± 112mV	200.008V	±20.2mV
200V Range : 56Hz	200.000V	± 112mV	200.009V	±20.2mV
200V Range : 206Hz	200.000V	± 112mV	200.003V	±20.2mV
200V Range : 1000Hz	200.000V	± 112mV	199.994V	±20.2mV
200V Range : 10kHz	200.000V	± 219mV	200.030V	±78.2mV
200V Range : 20kHz	200.000V	± 219mV	200.126V	±138mV

CERTIFICATE OF CALIBRATION

AFTER ADJUSTMENT RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
1kV Range : 40Hz	210.000V	± 214.5mV	210.067V	±21mV
1kV Range : 206Hz	210.000V	± 214.5mV	210.080V	±21mV
1kV Range : 10kHz	210.000V	± 479mV	210.069V	±79mV
1kV Range : 40Hz	700.000V	± 435mV	700.076V	±86.1mV
1kV Range : 56Hz	700.000V	± 435mV	700.248V	±86.1mV
1kV Range : 1kHz	700.000V	± 435mV	700.082V	±86.1mV
1kV Range : 5kHz	700.000V	± 920mV	700.095V	±121mV
1kV Range : 10kHz	700.000V	± 920mV	700.124V	±121mV
1kV Range : 56Hz	1000.000V	± 675mV	1000.208V	±114mV
1kV Range : 1KHz	1000.000V	± 675mV	999.965V	±114mV
Linearity - 20V DC Range				
Linearity	19.000000V	± 1.3mV	19.000210V	±0.23mV
Linearity	18.000000V	± 1.2mV	18.000200V	±0.22mV
Linearity	17.000000V	± 1.2mV	17.000250V	±0.22mV
Linearity	16.000000V	± 1.1mV	16.000200V	±0.21mV
Linearity	15.000000V	± 1.1mV	15.000240V	±0.2mV
Linearity	14.000000V	± 1mV	14.000140V	±0.2mV
Linearity	13.000000V	± 950uV	13.000210V	±187.9uV
Linearity	12.000000V	± 900uV	12.000140V	±180.6uV
Linearity	11.000000V	± 850uV	11.000110V	±173.3uV
Linearity	9.000000V	± 750uV	9.000055V	±55.2uV
Linearity	8.000000V	± 700uV	8.000076V	±49.9uV
Linearity	7.000000V	± 650uV	7.000024V	±44.6uV
Linearity	6.000000V	± 600uV	6.000032V	±39.3uV
Linearity	5.000000V	± 550uV	5.000047V	±34uV
Linearity	4.000000V	± 500uV	3.999999V	±28.7uV
Linearity	3.000000V	± 450uV	3.000010V	±23.4uV
Linearity	2.100000V	± 405uV	2.099961V	±18.6uV
Linearity	-19.000000V	± 1.3mV	-18.999710V	±0.23mV
Linearity	-18.000000V	± 1.2mV	-17.999810V	±0.22mV
Linearity	-17.000000V	± 1.2mV	-16.999810V	±0.22mV
Linearity	-16.000000V	± 1.1mV	-15.999750V	±0.21mV
Linearity	-15.000000V	± 1.1mV	-14.999840V	±0.2mV
Linearity	-14.000000V	± 1mV	-13.999800V	±0.2mV
Linearity	-13.000000V	± 950uV	-12.999820V	±187.9uV
Linearity	-12.000000V	± 900uV	-11.999830V	±180.6uV
Linearity	-11.000000V	± 850uV	-10.999850V	±173.3uV
Linearity	-9.000000V	± 750uV	-8.999863V	±55.2uV
Linearity	-8.000000V	± 700uV	-7.999908V	±49.9uV
Linearity	-7.000000V	± 650uV	-6.999884V	±44.6uV
Linearity	-6.000000V	± 600uV	-5.999915V	±39.3uV

CERTIFICATE OF CALIBRATION

AFTER ADJUSTMENT RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
Linearity	-5.000000V	± 550uV	-4.999961V	±34uV
Linearity	-4.000000V	± 500uV	-3.999931V	±28.7uV
Linearity	-3.000000V	± 450uV	-2.999957V	±23.4uV
Linearity	-2.100000V	± 405uV	-2.099928V	±18.6uV
DC Current				
200uA Range	0.0000uA	± 20nA	0.0001uA	±13pA
200uA Range	100.0000uA	± 32nA	99.9971uA	±1.4nA
200uA Range	200.0000uA	± 44nA	199.9888uA	±6.5nA
200uA Range	-100.0000uA	± 32nA	-99.9975uA	±1.4nA
200uA Range	-200.0000uA	± 44nA	-199.9902uA	±6.5nA
2mA Range	0.210000mA	± 101nA	0.210001mA	±6.6nA
2mA Range	1.000000mA	± 180nA	1.000024mA	±13.8nA
2mA Range	2.000000mA	± 280nA	2.000017mA	±73nA
2mA Range	-1.000000mA	± 180nA	-1.000016mA	±13.8nA
2mA Range	-2.000000mA	± 280nA	-2.000013mA	±73nA
20mA Range	5.00000mA	± 1.3uA	4.99992mA	±0.1uA
20mA Range	10.00000mA	± 1.8uA	9.99984mA	±0.2uA
20mA Range	15.00000mA	± 2.3uA	14.99950mA	±1.2uA
20mA Range	20.00000mA	± 2.8uA	19.99929mA	±1.4uA
20mA Range	-5.00000mA	± 1.3uA	-4.99999mA	±0.1uA
20mA Range	-10.00000mA	± 1.8uA	-10.00002mA	±0.2uA
20mA Range	-15.00000mA	± 2.3uA	-14.99980mA	±1.2uA
20mA Range	-20.00000mA	± 2.8uA	-19.99971mA	±1.4uA
200mA Range	100.0000mA	± 20uA	99.9977mA	±4.2uA
200mA Range	200.0000mA	± 32uA	200.0001mA	±49uA
200mA Range	-100.0000mA	± 20uA	-100.0001mA	±4.2uA
200mA Range	-200.0000mA	± 32uA	-200.0068mA	±49uA
2A Range	1.000000A	± 590uA	1.000078A	±185uA
2A Range	2.000000A	± 1.1mA	2.000170A	±0.4mA
2A Range	-1.000000A	± 590uA	-1.000099A	±185uA
2A Range	-2.000000A	± 1.1mA	-2.000236A	±0.4mA
22A Range	11.00000A	± 6.4mA	11.00170A	±3.5mA
22A Range	22.00000A	± 11.9mA	22.00344A	±6.6mA
22A Range	-22.00000A	± 11.9mA	-22.00559A	±6.6mA
22A Range	-11.00000A	± 6.4mA	-11.00337A	±3.5mA
AC Current				
200uA Rng: 40Hz	25.000uA	± 422.5nA	24.983uA	±132nA
200uA Rng: 206Hz	25.000uA	± 317.5nA	24.978uA	±132nA

CERTIFICATE OF CALIBRATION

AFTER ADJUSTMENT RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
200uA Rng: 10kHz	25.000uA	± 525nA	24.969uA	±205nA
200uA Rng: 10Hz	200.000uA	± 580nA	200.128uA	±276nA
200uA Rng: 40Hz	200.000uA	± 580nA	200.128uA	±158nA
200uA Rng: 56hz	200.000uA	± 440nA	200.071uA	±158nA
200uA Rng: 1kHz	200.000uA	± 440nA	200.078uA	±14958nA
200uA Rng: 10kHz	200.000uA	± 700nA	200.018uA	±730nA
2mA Rng: 40Hz	0.21000mA	± 789nA	0.21004mA	±161nA
2mA Rng: 206Hz	0.21000mA	± 547nA	0.21005mA	±161nA
2mA Rng: 10kHz	0.21000mA	± 910nA	0.20994mA	±564nA
2mA Rng: 10Hz	2.00000mA	± 2.4uA	2.00095mA	±1.4uA
2mA Rng: 40Hz	2.00000mA	± 2.4uA	2.00066mA	±0.6uA
2mA Rng: 56Hz	2.00000mA	± 1.8uA	2.00087mA	±0.6uA
2mA Rng: 1kHz	2.00000mA	± 1.8uA	2.00057mA	±0.6uA
2mA Rng: 10kHz	2.00000mA	± 2.6uA	2.00052mA	±3.3uA
20mA Rng: 40Hz	2.1000mA	± 5.9uA	2.1008mA	±0.6uA
20mA Rng: 206Hz	2.1000mA	± 4.5uA	2.1010mA	±0.6uA
20mA Rng: 10kHz	2.1000mA	± 8.1uA	2.1009mA	±3.4uA
20mA Rng: 56Hz	10.0000mA	± 10uA	10.0025mA	±2.4uA
20mA Rng: 10Hz	20.0000mA	± 22uA	20.0147mA	±15.3uA
20mA Rng: 40Hz	20.0000mA	± 22uA	20.0119mA	±5.3uA
20mA Rng: 1kHz	20.0000mA	± 17uA	20.0109mA	±5.3uA
20mA Rng: 10kHz	20.0000mA	± 26uA	20.0000mA	±16uA
200mA Rng: 40Hz	21.000mA	± 58.9uA	21.008mA	±5.5uA
200mA Rng: 206Hz	21.000mA	± 44.7uA	21.011mA	±5.5uA
200mA Rng: 10kHz	21.000mA	± 81uA	21.018mA	±17uA
200mA Rng: 10Hz	200.000mA	± 220uA	199.999mA	±139uA
200mA Rng: 40Hz	200.000mA	± 220uA	199.999mA	±55uA
200mA Rng: 56Hz	200.000mA	± 170uA	200.000mA	±55uA
200mA Rng: 1kHz	200.000mA	± 170uA	199.995mA	±55uA
200mA Rng: 10kHz	200.000mA	± 260uA	199.994mA	±322uA
2A Rng: 40Hz	0.21000A	± 660uA	0.20986A	±56.6uA
2A Rng: 206Hz	0.21000A	± 589uA	0.20984A	±56.6uA
2A Rng: 2kHz	0.21000A	± 589uA	0.20979A	±56.6uA
2A Rng: 10Hz	2.00000A	± 2.4mA	2.00020A	±1.5mA
2A Rng: 40Hz	2.00000A	± 2.4mA	2.00041A	±0.9mA
2A Rng: 56Hz	2.00000A	± 2.2mA	2.00016A	±0.9mA
2A Rng: 1kHz	2.00000A	± 2.2mA	2.00026A	±0.9mA
2A Rng: 2kHz	2.00000A	± 2.2mA	1.99963A	±3.4mA
22A Rng: 40Hz	2.10000A	± 13.2mA	2.09949A	±1mA

CERTIFICATE OF CALIBRATION

AFTER ADJUSTMENT RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
22A Rng: 206Hz	2.10000A	± 9.2mA	2.09802A	±1mA
22A Rng: 10Hz	22.00000A	± 53mA	22.00530A	±15.5mA
22A Rng: 40Hz	22.00000A	± 53mA	22.01080A	±15.5mA
22A Rng: 56Hz	22.00000A	± 39mA	22.00940A	±34.6mA
22A Rng: 100Hz	22.00000A	± 39mA	22.00750A	±34.6mA
22A Rng: 1kHz	22.00000A	± 52mA	22.00590A	±34.6mA

CERTIFICATE OF CALIBRATION

AFTER ADJUSTMENT RESULTS

Test Title	Applied Value	Tolerance	Reading	Uncertainty
2 Wire Resistance measured as value at terminals.				
100MR 2 Wire	100.0230MΩ	± 500kΩ	100.0460MΩ	±17.7kΩ
0R 2 Wire	0.1900Ω	± 55mΩ	0.2179Ω	±9uΩ
10R 2 Wire	10.196Ω	± 60mΩ	10.219Ω	±0.2mΩ
100R 2 Wire	100.199Ω	± 63mΩ	100.224Ω	±1.3mΩ
1kR 2 Wire	1.000211kΩ	± 95mΩ	1.000240kΩ	±11.7mΩ
10kR 2 Wire	10.00030kΩ	± 555mΩ	10.00042kΩ	±132mΩ
100kR 2 Wire	100.0051kΩ	± 5Ω	100.0066kΩ	±1.4Ω
1MR 2 Wire	0.999927MΩ	± 100Ω	0.999922MΩ	±16.7Ω
10MR 2 Wire	10.00386MΩ	± 5kΩ	10.00295MΩ	±0.3kΩ
4 Wire Ohms Measured relative to Zero				
10R 4 Wire	10.006094Ω	± 25mΩ	10.006490Ω	±0.12mΩ
100R 4 Wire	99.99423Ω	± 28mΩ	99.99210Ω	±1.3mΩ
1kR 4 Wire	1.0000000kΩ	± 70mΩ	1.0000045kΩ	±11.7mΩ
10kR 4 Wire	10.000082kΩ	± 520mΩ	10.000190kΩ	±0.1mΩ
100kR 4 Wire	100.00510kΩ	± 5Ω	100.00640kΩ	±1.4Ω
Capacitance @ 1kHz Measured Cp up to 1uF, Cs above				
10nF	10.059nF	± 60pF	10.058nF	±6pF
20nF	19.959nF	± 100pF	19.955nF	±12pF
50nF	49.482nF	± 220pF	49.484nF	±30pF
100nF	99.22nF	± 420pF	99.17nF	±60pF
1uF	1.0002uF	± 6nF	1.0000uF	±0.6nF
Reference Frequency Output				
Frequency	10.000000MHz	± 130Hz	9.999977MHz	±2Hz
Frequency	1.0000000MHz	± 12.1Hz	0.9999972MHz	±0.2Hz
Frequency	100.00000kHz	± 2.2Hz	99.99972kHz	±0.02Hz
Frequency	50.000000kHz	± 700mHz	49.999862kHz	±0.01Hz
Frequency	20.000000kHz	± 340mHz	19.999945kHz	±0.004Hz
Frequency	10.000000kHz	± 130mHz	9.999973kHz	±2mHz
Frequency	1.0000000kHz	± 12.1mHz	0.9999971kHz	±0.2mHz
Frequency	100.00000Hz	± 2.2mHz	99.99973Hz	±0.02mHz

End Of Results

END OF TEST DATA