CERTIFICATE OF CALIBRATION

Issued By Transmille Ltd.

Certificate Number **EXAMPLE**

Date of Issue

0324

Approved Signatory

Transmille Ltd.
Unit 4, Select Business Centre
Lodge Road
Staplehurst, Kent. TN12 0QW.
TEL 01580 890700 FAX 01580 890711

www.transmille.com

Customer : EXAMPLE

Date Received :

Instrument :

System ID :	EXAMPLE	Job Number :	EXAMPLE
Description :	Multi Product Calibrator		
Manufacturer :	Transmille		
Model Number :	9041A		
Serial Number :	EXAMPLE		
Procedure Number & Version :	5565 : 8091-2.1/N		

Environmental Conditions

Temperature :	20°C ± 1°C	Mains Voltage :	230V ± 12V
Relative Humidity :	40%RH ± 20%RH	Mains Frequency :	50Hz ± 1Hz

Comments

Instrument was allowed to stabilise for at least 12 hours before calibration.
4 Wire kelvin connections were used for ohms measurements below 10kOhms
The instrument USB interface was used during calibration
PT100 resistance converted to temperature using BS1904 tables.
Tests marked # are not UKAS accredited but have been included for completeness.

Calibration Information

The instrument was calibrated against laboratory standards whose values are traceable to recognised National Standards. The uncertainty limits quoted refer to the measured values only, with no account being taken of the instruments ability to maintain its calibration.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor *k*=2, providing a level of confidence of approximatley 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Calibrated By : **Date of Calibration :**

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

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AFTER ADJUSTMENT RESULTS

Test Title	Applied Value	Reading	Uncertainty
Firmware Version : 13.1.07			
DC Voltage			
200mV Range	0.0000mV	0.0002mV	±0.6uV
200mV Range	1.0000mV	1.0006mV	±0.8uV
200mV Range	10.0000mV	10.0006mV	±0.8uV
200mV Range	100.0000mV	100.0006mV	±0.8uV
200mV Range	200.0000mV	199.9992mV	±0.9uV
200mV Range	-1.0000mV	-0.9993mV	±0.8uV
200mV Range	-10.0000mV	-9.9994mV	±0.8uV
200mV Range	-100.0000mV	-99.9994mV	±0.8uV
200mV Range	-200.0000mV	-199.9992mV	±0.9uV
2V Range	0.2200000V	0.2200041V	±0.9uV
2V Range	1.0000000V	1.0000047V	±2.1uV
2V Range	2.0000000V	1.9999935V	±7uV
2V Range	-0.2200000V	-0.2199961V	±0.9uV
2V Range	-1.0000000V	-0.9999971V	±2.1uV
2V Range	-2.0000000V	-1.9999992V	±7uV
20V Range	2.200000V	2.200024V	±7uV
20V Range	10.000000V	10.000018V	±33uV
20V Range	20.000000V	19.999980V	±66uV
20V Range	-2.200000V	-2.199969V	±7uV
20V Range	-10.000000V	-9.999954V	±33uV
20V Range	-20.000000V	-19.999997V	±66uV
200V Range	100.00000V	99.99999V	±330uV
200V Range	200.00000V	199.99970V	±660uV
200V Range	-200.00000V	-200.00037V	±660uV
200V Range	-100.00000V	-99.99943V	±330uV
1kV Range	220.0000V	219.9994V	±0.8mV
1kV Range	1000.0000V	999.9940V	±3.3mV
1kV Range	-1000.0000V	-999.9986V	±3.3mV
1kV Range	-220.0000V	-220.0006V	±0.8mV
AC Voltage Output Frequency Tests			
10kHz at 2V	10.00000kHz	10.00000kHz	±0.01Hz
100kHz at 2V	100.0000kHz	100.0000kHz	±0.1Hz
AC Voltage Measurements			
200mV A.C. : 40Hz	20.000mV	20.007mV	±20uV
200mV A.C. : 206Hz	20.000mV	20.005mV	±20uV
200mV A.C. : 10Hz#	200.000mV	200.038mV	±60uV
200mV A.C. : 40Hz	200.000mV	200.021mV	±46uV
200mV A.C. : 56Hz	200.000mV	200.005mV	±46uV
200mV A.C. : 206Hz	200.000mV	200.006mV	±46uV
200mV A.C. : 1kHz	200.000mV	200.031mV	±46uV
200mV A.C. : 10kHz	200.000mV	200.029mV	±46uV
200mV A.C. : 20kHz	200.000mV	200.069mV	±70uV
200mV A.C. : 100kHz#	200.000mV	198.920mV	±680uV
200mV A.C. : 500kHz#	200.000mV	200.116mV	±680uV

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Test Title	Applied Value	Reading	Uncertainty
2V Range : 40Hz	0.21000V	0.21002V	±49uV
2V Range : 206Hz	0.21000V	0.20996V	±49uV
2V Range. : 206Hz	1.00000V	1.00005V	±120uV
2V Range : 206Hz	1.50000V	1.50005V	±180uV
2V Range : 10Hz#	2.00000V	2.00007V	±600uV
2V Range : 40Hz	2.00000V	1.99976V	±240uV
2V Range : 56Hz	2.00000V	1.99989V	±240uV
2V Range : 206Hz	2.00000V	1.99991V	±240uV
2V Range: 1kHz	2.00000V	1.99986V	±240uV
2V Range : 5kHz	2.00000V	2.00035V	±400uV
2V Range : 10kHz	2.00000V	2.00006V	±400uV
2V Range : 20kHz	2.00000V	1.99996V	±400uV
2V Range : 50kHz	2.00000V	2.00124V	±400uV
2V Range : 100kHz#	2.00000V	2.00056V	±4.8mV
2V Range : 500kHz#	2.00000V	1.99992V	±4.8mV
20V Range : 40Hz	2.1000V	2.1001V	±260uV
20V Range : 206Hz	2.1000V	2.0998V	±260uV
20V Range : 100kHz #	2.1000V	2.1032V	±5mV
20V Range : 200Hz	10.0000V	9.9999V	±1.2mV
20V Range : 200Hz	15.0000V	14.9996V	±1.8mV
20V Range : 10Hz#	20.0000V	20.0013V	±4.2mV
20V Range : 40Hz	20.0000V	19.9979V	±2.4mV
20V Range : 56Hz	20.0000V	19.9993V	±2.4mV
20V Range : 206Hz	20.0000V	19.9992V	±2.4mV
20V Range : 1kHz	20.0000V	19.9989V	±2.4mV
20V Range : 5kHz	20.0000V	19.9996V	±4mV
20V Range : 10kHz	20.0000V	20.0002V	±4mV
20V Range : 20kHz	20.0000V	20.0004V	±4mV
20V Range : 100kHz #	20.0000V	20.0049V	±41mV
200V Range : 40Hz	21.000V	20.997V	±2.6mV
200V Range : 206Hz	21.000V	20.995V	±2.6mV
200V Range : 20kHz	21.000V	20.996V	±4.2mV
200V Range : 206Hz	100.000V	100.002V	±12mV
200V Range : 30Hz#	200.000V	200.022V	±42mV
200V Range : 40Hz	200.000V	199.997V	±24mV
200V Range : 56Hz	200.000V	199.997V	±24mV
200V Range : 206Hz	200.000V	199.961V	±24mV
200V Range : 1000Hz	200.000V	199.998V	±24mV
200V Range : 10kHz	200.000V	199.992V	±40mV
200V Range : 20kHz	200.000V	199.986V	±40mV
1kV Range : 40Hz	210.000V	209.978V	±45mV
1kV Range : 206Hz	210.000V	209.977V	±45mV
1kV Range : 10kHz	210.000V	209.934V	±45mV
1kV Range : 30Hz#	700.000V	700.010V	±230mV
1kV Range : 40Hz	700.000V	699.950V	±148mV
1kV Range : 56Hz	700.000V	700.027V	±148mV
1kV Range : 1kHz	700.000V	700.001V	±148mV
1kV Range : 5kHz	700.000V	700.086V	±148mV

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Test Title	Applied Value	Reading	Uncertainty
1kV Range : 10kHz	700.000V	699.806V	±148mV
1kV Range : 56Hz	1000.000V	999.903V	±210mV
Linearity - 20V DC Range			
Linearity	19.000000V	19.000060V	±63uV
Linearity	18.000000V	18.000080V	±60uV
Linearity	17.000000V	17.000040V	±57uV
Linearity	16.000000V	16.000090V	±53uV
Linearity	15.000000V	15.000060V	±50uV
Linearity	14.000000V	14.000080V	±47uV
Linearity	13.000000V	13.000100V	±43uV
Linearity	12.000000V	12.000060V	±40uV
Linearity	11.000000V	11.000050V	±37uV
Linearity	9.000000V	9.000065V	±30uV
Linearity	8.000000V	8.000073V	±27uV
Linearity	7.000000V	7.000064V	±24uV
Linearity	6.000000V	6.000063V	±20uV
Linearity	5.000000V	5.000059V	±17uV
Linearity	4.000000V	4.000056V	±14uV
Linearity	3.000000V	3.000054V	±10uV
Linearity	2.100000V	2.100042V	±7uV
Linearity	-19.000000V	-19.000010V	±63uV
Linearity	-18.000000V	-18.000020V	±60uV
Linearity	-17.000000V	-17.000010V	±57uV
Linearity	-16.000000V	-16.000010V	±53uV
Linearity	-15.000000V	-15.000020V	±50uV
Linearity	-14.000000V	-14.000030V	±47uV
Linearity	-13.000000V	-13.000060V	±43uV
Linearity	-12.000000V	-12.000080V	±40uV
Linearity	-11.000000V	-11.000030V	±37uV
Linearity	-9.000000V	-8.999973V	±30uV
Linearity	-8.000000V	-7.999972V	±27uV
Linearity	-7.000000V	-6.999979V	±24uV
Linearity	-6.000000V	-5.999972V	±20uV
Linearity	-5.000000V	-4.999979V	±17uV
Linearity	-4.000000V	-3.999973V	±14uV
Linearity	-3.000000V	-2.999971V	±10uV
Linearity	-2.100000V	-2.099977V	±7uV
DC CURRENT			
200uA Range	0.0000uA	-0.0001uA	±0.2nA
200uA Range	100.0000uA	99.9979uA	±0.2nA
200uA Range	200.0000uA	199.9955uA	±2.7nA
200uA Range	-100.0000uA	-99.9998uA	±0.2nA
200uA Range	-200.0000uA	-200.0006uA	±2.7nA
2mA Range	0.210000mA	0.210002mA	±2.7nA
2mA Range	1.000000mA	1.000003mA	±0.2nA
2mA Range	2.000000mA	1.999994mA	±34nA
2mA Range	-1.000000mA	-1.000000mA	±0.2nA
2mA Range	-2.000000mA	-2.000006mA	±34nA

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Test Title	Applied Value	Reading	Uncertainty
20mA Range	5.00000mA	4.99998mA	±34nA
20mA Range	10.00000mA	9.99995mA	±34nA
20mA Range	15.00000mA	14.99996mA	±380nA
20mA Range	20.00000mA	20.00001mA	±380nA
20mA Range	-5.00000mA	-4.99986mA	±34nA
20mA Range	-10.00000mA	-9.99979mA	±34nA
20mA Range	-15.00000mA	-14.99990mA	±380nA
20mA Range	-20.00000mA	-19.99987mA	±380nA
200mA Range	100.0000mA	99.9983mA	±380nA
200mA Range	200.0000mA	199.9984mA	±8.7uA
200mA Range	-100.0000mA	-99.9970mA	±380nA
200mA Range	-200.0000mA	-199.9996mA	±8.7uA
2A Range	1.000000A	1.000010A	±8.7uA
2A Range	2.000000A	1.999963A	±96uA
2A Range	-1.000000A	-1.000013A	±8.7uA
2A Range	-2.000000A	-1.999975A	±96uA
30A Range	10.00000A	9.99911A	±0.48mA
30A Range	20.00000A	19.99929A	±0.68mA
30A Range	30.00000A	30.00150A	±4.4mA
30A Range	-30.00000A	-30.00101A	±4.4mA
30A Range	-20.00000A	-19.99984A	±0.68mA
30A Range	-10.00000A	-9.99956A	±0.48mA
AC CURRENT			
200uA Rng: 40Hz	25.000uA	25.003uA	±15nA
200uA Rng: 206Hz	25.000uA	24.996uA	±15nA
200uA Rng: 10kHz#	25.000uA	24.993uA	±49nA
200uA Rng: 10Hz#	200.000uA	200.007uA	±260nA
200uA Rng: 40Hz	200.000uA	200.033uA	±49nA
200uA Rng: 56Hz	200.000uA	200.023uA	±49nA
200uA Rng: 1kHz	200.000uA	199.995uA	±49nA
200uA Rng: 10kHz#	200.000uA	199.841uA	±247nA
2mA Rng: 40Hz	0.21000mA	0.20997mA	±55nA
2mA Rng: 206Hz	0.21000mA	0.20999mA	±55nA
2mA Rng: 10kHz#	0.21000mA	0.21006mA	±0.19uA
2mA Rng: 10Hz#	2.00000mA	2.00007mA	±2.6uA
2mA Rng: 40Hz	2.00000mA	1.99970mA	±400nA
2mA Rng: 56Hz	2.00000mA	2.00011mA	±400nA
2mA Rng: 1kHz	2.00000mA	2.00001mA	±400nA
2mA Rng: 10kHz#	2.00000mA	2.00055mA	±1.8uA
20mA Rng: 40Hz	2.1000mA	2.0995mA	±430nA
20mA Rng: 206Hz	2.1000mA	2.0999mA	±430nA
20mA Rng: 10kHz#	2.1000mA	2.1001mA	±1.9uA
20mA Rng: 56Hz	10.0000mA	10.0006mA	±2uA
20mA Rng: 10Hz#	20.0000mA	20.0003mA	±26uA
20mA Rng: 40Hz	20.0000mA	19.9994mA	±4uA
20mA Rng: 1kHz	20.0000mA	20.0000mA	±4uA

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Test Title	Applied Value	Reading	Uncertainty
20mA Rng: 1kHz	20.0000mA	20.0000mA	±4uA
20mA Rng: 10kHz#	20.0000mA	20.0014mA	±18uA
200mA Rng: 40Hz	21.000mA	20.998mA	±4.2uA
200mA Rng: 206Hz	21.000mA	20.999mA	±4.2uA
200mA Rng: 10kHz	21.000mA	21.001mA	±19uA
200mA Rng: 10Hz#	200.000mA	200.005mA	±260uA
200mA Rng: 40Hz	200.000mA	199.997mA	±40uA
200mA Rng: 56Hz	200.000mA	200.000mA	±40uA
200mA Rng: 1kHz	200.000mA	200.001mA	±40uA
200mA Rng: 10kHz#	200.000mA	199.992mA	±180uA
2A Rng: 40Hz	0.21000A	0.20993A	±42uA
2A Rng: 206Hz	0.21000A	0.20998A	±42uA
2A Rng: 5kHz#	0.21000A	0.20990A	±0.19mA
2A Rng: 10Hz#	2.00000A	2.00003A	±2.6mA
2A Rng: 40Hz	2.00000A	1.99989A	±0.5mA
2A Rng: 56Hz	2.00000A	2.00003A	±0.5mA
2A Rng: 1kHz	2.00000A	2.00053A	±0.5mA
2A Rng: 5kHz #	2.00000A	1.99886A	±1.8mA
30A Lead Check	1.000A	1.000A	±1nA
30A Rng: 40Hz	2.10000A	2.09869A	±530uA
30A Rng: 206Hz	2.10000A	2.09940A	±530uA
30A Rng: 10Hz#	20.00000A	20.00550A	±26mA
30A Rng: 40Hz	20.00000A	19.99800A	±5mA
30A Rng: 56Hz	20.00000A	20.00020A	±5mA
30A Rng: 100Hz	20.00000A	20.00080A	±5mA
30A Rng: 1kHz #	20.00000A	20.00110A	±5mA
30A Rng: 56Hz	30.00000A	30.00650A	±13mA

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Test Title	Applied Value	Reading	Uncertainty
2 Wire Resistance measured as value at terminals.			
100MR 2 Wire	100.0000MΩ	100.0235MΩ	±4.5kΩ
1000MR 2 Wire	997.21MΩ	996.91MΩ	±390kΩ
0R 2 Wire	0.2050Ω	0.2053Ω	±0.8mΩ
0.1R 2 Wire	0.3040Ω	0.3044Ω	±0.8mΩ
1R 2 Wire	1.3170Ω	1.3168Ω	±0.8mΩ
10R 2 Wire	10.216Ω	10.216Ω	±1mΩ
100R 2 Wire	100.230Ω	100.228Ω	±1.3mΩ
1kR 2 Wire	1.000249kΩ	1.000244kΩ	±3.8mΩ
10kR 2 Wire	9.99960kΩ	9.99960kΩ	±21mΩ
100kR 2 Wire	100.0013kΩ	100.0013kΩ	±620mΩ
1MR 2 Wire	0.998030MΩ	0.998021MΩ	±14Ω
10MR 2 Wire	9.99808MΩ	9.99809MΩ	±150Ω
4 Wire Ohms Measured relative to Zero			
100mR 4 Wire	100.00mΩ	99.93mΩ	±132uΩ
1R 4 Wire	1.00000Ω	1.00025Ω	±143uΩ
10R 4 Wire	10.010048Ω	10.009853Ω	±150uΩ
100R 4 Wire	100.00172Ω	100.00168Ω	±0.4mΩ
1kR 4 Wire	1.0000138kΩ	1.0000152kΩ	±3mΩ
10kR 4 Wire	9.999406kΩ	9.999411kΩ	±12mΩ
100kR 4 Wire	100.00130kΩ	100.00107kΩ	±800mΩ
Capacitance @ 1kHz Measured Cp up to 1uF, Cs above			
1nF	0.9978nF	0.9978nF	±2pF
10nF	10.181nF	10.181nF	±20pF
20nF	20.162nF	20.161nF	±40pF
50nF	50.256nF	50.257nF	±100pF
100nF	99.92nF	99.91nF	±100pF
1uF	1.0434uF	1.0434uF	±0.25nF
10uF	9.910uF	9.910uF	±23nF
Reference Frequency Output			
Frequency	10.000000MHz	9.999983MHz	±2Hz
Frequency	1.0000000MHz	1.0000000MHz	±0.2Hz
Frequency	100.00000kHz	100.00000kHz	±0.02Hz
Frequency	50.000000kHz	50.000000kHz	±0.01Hz
Frequency	20.000000kHz	20.000000kHz	±0.004Hz
Frequency	10.000000kHz	10.000000kHz	±2mHz
Frequency	1.0000000kHz	1.0000000kHz	±0.2mHz
Frequency	100.00000Hz	100.00003Hz	±0.02mHz
A/D input			
10V A/D input	10.0000V	10.0000V	±100uV
5V A/D input	5.0000V	4.9999V	±100uV
0V A/D input	0.0000V	0.0000V	±100uV
-5V A/D input	-5.0000V	-4.9999V	±100uV
-10V A/D input	-10.0000V	-10.0000V	±100uV

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AFTER ADJUSTMENT RESULTS

Test Title	Applied Value	Reading	Uncertainty
Dry Block Temperature Module			
50°C #	50.0°C	50.0°C	±0.2°C
100°C #	100.0°C	100.2°C	±0.2°C
150°C #	150.0°C	150.0°C	±0.2°C
200°C #	200.0°C	200.1°C	±0.2°C
Black Body (IR) Temperature Module			
50°C #	50.0°C	50.3°C	±0.5°C
100°C #	100.0°C	100.3°C	±0.5°C
150°C #	150.0°C	150.0°C	±0.5°C
200°C #	200.0°C	200.0°C	±0.5°C
End Of Test Results			

END OF TEST DATA

EXAMPLE