



MICRO PRECISION CALIBRATION PTE LTD
BLOCK 5008 ANG MO KIO AVENUE 5 #07-04
TECHPLACE II SINGAPORE 569874
65 67484384



Certificate of Calibration

Date: February 21, 2019

Cert No. 551220082826573

Customer:

GES SINGAPORE PTE LTD
28 MARSILING LANE
SINGAPORE 739152

Work Order #: SG-11010042

MPC Control #: MY44028120

Serial Number: MY44028120

Asset ID: NA

Department: N/A

Gage Type: FUNCTION / ARBITRARY WAVEFORM GENERATOR

Performed By: SENGTHYE CHEW

Manufacturer: AGILENT

Received Condition: IN TOLERANCE

Model Number: 33220A

Returned Condition: IN TOLERANCE

Size: N/A

Cal. Date: February 21, 2019

Temp/RH: 24.2°C / 42 %

Cal. Interval: 12 MONTHS

Location: Calibration performed at Customer's facility

Cal. Due Date: February 21, 2020

Calibration Notes:

Please refer to the attached calibration data. (2 pages).

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AP4205	MULTIMETER	3458A	2823A17096	HEWLETT PACKARD	Oct 10, 2019	551220081610396
DH1020	AVERAGE POWER SENSOR	E9304A	MY52310009	AGILENT	Mar 16, 2019	512200813300943
CC1000	POWER METER	E4419B	GB43311500	AGILENT	Sep 14, 2019	551220081569093

Procedures Used in this Event

Procedure Name	Description
AGILENT 33220A	20 MHz Waveform Generator Service Guide, PN 33220-90012

Calibrating Technician:


SENGTHYE CHEW

QC Approval:


JULES PHILIPPE AGPANGAN

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered comply with ISO/IEC 17025:2017, ANSI/NCSL Z540-1-1994, ANSI/NCSL Z540.3-2006, MPC Quality Manual, MPC CSD and with customer purchase order instructions.

Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. The information on this report, pertains only to the instrument identified.

All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. This report may not be reproduced in part or in a whole without the prior written approval of the issuing MPC lab.



Agilent 33220A Function / Arbitrary Waveform Generator

Procedure: AGILENT 33220A

Order Number: SG-11010042

ID Number: MY44028120

Calibration Date: February 21, 2019

Section 1 - Internal Timebase Verification

Frequency in MHz

Parameter	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
Frequency	10.000000 MHz	9.999800 MHz	NA	NA	10.000200 MHz	NA	NA

Section 2 - AC Amplitude (high impedance) Accuracy

with OUT TERM set at HIGH Z; sinewave

Frequency	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
1.0 kHz	0.02000 Vrms	0.01909 Vrms	0.01992 Vrms	0.01992 Vrms	0.02091 Vrms	PASS	0.00001742
1.0 kHz	0.06700 Vrms	0.06562 Vrms	0.06697 Vrms	0.06697 Vrms	0.06838 Vrms	PASS	0.00000741
1.0 kHz	0.20000 Vrms	0.19729 Vrms	0.19903 Vrms	0.19903 Vrms	0.20271 Vrms	PASS	0.00021099
1.0 kHz	0.67000 Vrms	0.66259 Vrms	0.66733 Vrms	0.66733 Vrms	0.67741 Vrms	PASS	0.00058137
1.0 kHz	2.00000 Vrms	1.97930 Vrms	1.99108 Vrms	1.99108 Vrms	2.02070 Vrms	PASS	0.00194224
1.0 kHz	7.00000 Vrms	6.92930 Vrms	7.00031 Vrms	7.00031 Vrms	7.07070 Vrms	PASS	0.00006760
1kHz/Square wave	0.90000 Vrms	0.89000 Vrms	0.90054 Vrms	0.90054 Vrms	0.91000 Vrms	PASS	0.00011802

Section 3 - Low Frequency Flatness Accuracy

with OUT TERM set at HIGH Z; sinewave

Frequency	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
100.0 kHz	0.67000 Vrms	0.66330 Vrms	0.67105 Vrms	0.67105 Vrms	0.67670 Vrms	PASS	0.00022863
100.0 kHz	2.00000 Vrms	1.98000 Vrms	2.00088 Vrms	2.00088 Vrms	2.02000 Vrms	PASS	0.00019165
100.0 kHz	7.00000 Vrms	6.93000 Vrms	7.01805 Vrms	7.01805 Vrms	7.07000 Vrms	PASS	0.00393021

Section 4 - Flatness

0dB Range; Referenced to 1Khz

Frequency	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
100.00 kHz	0.000 dB	-0.100 dB	0.004 dB	0.004 dB	0.100 dB	PASS	0.05000759
200.00 kHz	0.000 dB	-0.150 dB	-0.008 dB	0.009 dB	0.150 dB	PASS	0.07502023
0.50 MHz	0.000 dB	-0.150 dB	0.012 dB	0.015 dB	0.150 dB	PASS	0.07504550
2.00 MHz	0.000 dB	-0.150 dB	0.017 dB	0.026 dB	0.150 dB	PASS	0.07509129
3.00 MHz	0.000 dB	-0.150 dB	0.043 dB	0.031 dB	0.150 dB	PASS	0.07558216
4.00 MHz	0.000 dB	-0.150 dB	0.038 dB	0.036 dB	0.150 dB	PASS	0.07545503
5.00 MHz	0.000 dB	-0.150 dB	0.047 dB	0.035 dB	0.150 dB	PASS	0.07569498
8.00 MHz	0.000 dB	-0.300 dB	0.036 dB	0.039 dB	0.300 dB	PASS	0.15020467
10.00 MHz	0.000 dB	-0.300 dB	0.044 dB	0.044 dB	0.300 dB	PASS	0.15030565
12.50 MHz	0.000 dB	-0.300 dB	0.054 dB	0.051 dB	0.300 dB	PASS	0.15046013
14.00 MHz	0.000 dB	-0.300 dB	0.043 dB	0.047 dB	0.300 dB	PASS	0.15029192
16.00 MHz	0.000 dB	-0.300 dB	0.078 dB	0.050 dB	0.300 dB	PASS	0.15095843
17.50 MHz	0.000 dB	-0.300 dB	0.081 dB	0.058 dB	0.300 dB	PASS	0.15103331
20.00 MHz	0.000 dB	-0.300 dB	0.085 dB	0.064 dB	0.300 dB	PASS	0.15113749

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ID Number: MY44028120
Section 4 - Flatness (Continued)

10dB Range; Referenced to 1KHz

Frequency	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
100.00 kHz	0.000 dB	-0.100 dB	0.006 dB	0.006 dB	0.100 dB	PASS	0.05001706
200.00 kHz	0.000 dB	-0.150 dB	0.015 dB	0.015 dB	0.150 dB	PASS	0.07507108
0.50 MHz	0.000 dB	-0.150 dB	0.026 dB	0.026 dB	0.150 dB	PASS	0.07521336
2.00 MHz	0.000 dB	-0.150 dB	0.034 dB	0.034 dB	0.150 dB	PASS	0.07536449
3.00 MHz	0.000 dB	-0.150 dB	0.048 dB	0.048 dB	0.150 dB	PASS	0.07572473
4.00 MHz	0.000 dB	-0.150 dB	0.056 dB	0.056 dB	0.150 dB	PASS	0.07598474
5.00 MHz	0.000 dB	-0.150 dB	0.067 dB	0.067 dB	0.150 dB	PASS	0.07640567
8.00 MHz	0.000 dB	-0.300 dB	0.069 dB	0.069 dB	0.300 dB	PASS	0.15075053
10.00 MHz	0.000 dB	-0.300 dB	0.069 dB	0.069 dB	0.300 dB	PASS	0.15075053
12.50 MHz	0.000 dB	-0.300 dB	0.071 dB	0.071 dB	0.300 dB	PASS	0.15079455
14.00 MHz	0.000 dB	-0.300 dB	0.078 dB	0.078 dB	0.300 dB	PASS	0.15095843
16.00 MHz	0.000 dB	-0.300 dB	0.083 dB	0.083 dB	0.300 dB	PASS	0.15108479
17.50 MHz	0.000 dB	-0.300 dB	0.089 dB	0.089 dB	0.300 dB	PASS	0.15124662
20.00 MHz	0.000 dB	-0.300 dB	0.085 dB	0.085 dB	0.300 dB	PASS	0.15113749

20dB Range; Referenced to 1KHz

Frequency	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
100.00 kHz	0.000 dB	-0.100 dB	0.008 dB	0.008 dB	0.100 dB	PASS	0.05003033
200.00 kHz	0.000 dB	-0.150 dB	0.016 dB	0.016 dB	0.150 dB	PASS	0.07508087
0.50 MHz	0.000 dB	-0.150 dB	0.027 dB	0.027 dB	0.150 dB	PASS	0.07523006
2.00 MHz	0.000 dB	-0.150 dB	0.035 dB	0.035 dB	0.150 dB	PASS	0.07538619
3.00 MHz	0.000 dB	-0.150 dB	0.047 dB	0.047 dB	0.150 dB	PASS	0.07569498
4.00 MHz	0.000 dB	-0.150 dB	0.054 dB	0.054 dB	0.150 dB	PASS	0.07591607
5.00 MHz	0.000 dB	-0.150 dB	0.059 dB	0.059 dB	0.150 dB	PASS	0.07609229
8.00 MHz	0.000 dB	-0.300 dB	0.062 dB	0.062 dB	0.300 dB	PASS	0.15060626
10.00 MHz	0.000 dB	-0.300 dB	0.068 dB	0.068 dB	0.300 dB	PASS	0.15072899
12.50 MHz	0.000 dB	-0.300 dB	0.071 dB	0.071 dB	0.300 dB	PASS	0.15079455
14.00 MHz	0.000 dB	-0.300 dB	0.075 dB	0.075 dB	0.300 dB	PASS	0.15088633
16.00 MHz	0.000 dB	-0.300 dB	0.079 dB	0.079 dB	0.300 dB	PASS	0.15098308
17.50 MHz	0.000 dB	-0.300 dB	0.083 dB	0.083 dB	0.300 dB	PASS	0.15108479
20.00 MHz	0.000 dB	-0.300 dB	0.089 dB	0.089 dB	0.300 dB	PASS	0.15124662

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