

# Calibration Report



## General Information

Object:	BODE 100
Serial Number:	SG463K
Options:	Rev. 2
Manufacturer:	OMICRON electronics GmbH
Calibration Date:	2020-09-16
Test Engineer:	Mr. Dilbert

## Overall Result / Conformity

Overall Assessment:	<b>pass</b>
Specified Assessments:	176
Passed:	176
Failed:	0

## Procedure

Calibration Software:	2.4
Page Count:	11

## Ambient Conditions

**Temperature:** 23.0 °C ± 5.0 °C  
 73.4 °F ± 9.0 °F  
**Relative Humidity:** 45.0 % ± 20.0 %

## Calibration Reference Equipment

Manufacturer	Model	SerialNo	TraceNo	Calibrated Due
OMICRON	FRA_TU	01	15-087	2021-03-12
OMICRON	Bode 100	LM418C	15-166	2021-03-13
Keysight	3458A	MY45052909	16-284	2021-01-15
Pendulum	CNT-90	336461	15-501	2020-12-09

## Test Results – Overview

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## Test Results – Detail

### 1 Calibration

#### 1.1 Output Frequency Calibration

Nominal in kHz	Actual in kHz	Error in Hz	Spec in Hz	Of Spec in %	Verdict
1000.00001	999.99991	-0.10	2.00	-5.2	pass

#### 1.2 Output Power Calibration

Frequency in MHz	Nominal in dBm	Actual in dBm	Error in dBm	Spec in dBm	Of Spec in %	Verdict
0.001	11.0	11.003	0.003	0.300	1.1	pass
0.010	11.0	11.000	0.000	0.300	-0.1	pass
0.030	11.0	11.000	0.000	0.300	0.0	pass
0.100	11.0	11.006	0.006	0.300	2.0	pass
0.300	11.0	10.970	-0.030	0.300	-10.0	pass
1.000	11.0	10.942	-0.058	0.300	-19.3	pass
3.000	11.0	10.902	-0.098	0.600	-16.3	pass
10.000	11.0	10.836	-0.164	0.600	-27.3	pass
30.000	11.0	10.959	-0.041	0.600	-6.8	pass
50.000	11.0	10.901	-0.099	0.600	-16.5	pass

#### 1.3 ReturnLoss Calibration

##### 1.3.1 Output

###### Return Loss

Frequency in MHz	Actual in dB	Spec in dB	Verdict
0.00001	-58.3	<-30.0	pass
0.00003	-57.9	<-30.0	pass
0.00010	-58.5	<-30.0	pass
0.00030	-58.1	<-30.0	pass
0.00100	-58.3	<-30.0	pass
0.00300	-58.0	<-30.0	pass
0.01000	-56.6	<-30.0	pass
0.03000	-55.5	<-30.0	pass
0.10000	-52.4	<-30.0	pass

Frequency in MHz	Actual in dB	Spec in dB	Verdict
0.30000	-49.0	<-30.0	pass
1.00000	-45.5	<-30.0	pass
3.00000	-42.6	<-30.0	pass
10.00000	-39.3	<-30.0	pass
30.00000	-38.1	<-30.0	pass
50.00000	-39.8	<-30.0	pass

### 1.3.2 CH1

#### Return Loss

Frequency in MHz	Actual in dB	Spec in dB	Verdict
0.00001	-56.7	<-28.0	pass
0.00003	-56.8	<-28.0	pass
0.00010	-56.7	<-28.0	pass
0.00030	-57.1	<-28.0	pass
0.00100	-56.7	<-28.0	pass
0.00300	-56.5	<-28.0	pass
0.01000	-55.9	<-28.0	pass
0.03000	-54.2	<-28.0	pass
0.10000	-51.7	<-28.0	pass
0.30000	-48.3	<-28.0	pass
1.00000	-45.2	<-28.0	pass
3.00000	-42.6	<-28.0	pass
10.00000	-43.8	<-28.0	pass
30.00000	-45.8	<-28.0	pass
50.00000	-32.6	<-28.0	pass

### 1.3.3 CH1 with >20dB Attenuator

#### Return Loss

Frequency in MHz	Actual in dB	Spec in dB	Verdict
0.00001	-56.7	<-28.0	pass
0.00003	-56.9	<-28.0	pass
0.00010	-56.7	<-28.0	pass
0.00030	-56.9	<-28.0	pass
0.00100	-56.8	<-28.0	pass
0.00300	-56.6	<-28.0	pass
0.01000	-55.2	<-28.0	pass
0.03000	-54.3	<-28.0	pass

Frequency in MHz	Actual in dB	Spec in dB	Verdict
0.10000	-51.6	<-28.0	pass
0.30000	-48.4	<-28.0	pass
1.00000	-44.9	<-28.0	pass
3.00000	-41.5	<-28.0	pass
10.00000	-38.0	<-28.0	pass
30.00000	-40.5	<-28.0	pass
50.00000	-37.4	<-28.0	pass

### 1.3.4 CH2

#### Return Loss

Frequency in MHz	Actual in dB	Spec in dB	Verdict
0.00001	-55.1	<-28.0	pass
0.00003	-55.0	<-28.0	pass
0.00010	-55.3	<-28.0	pass
0.00030	-55.2	<-28.0	pass
0.00100	-55.1	<-28.0	pass
0.00300	-55.0	<-28.0	pass
0.01000	-55.0	<-28.0	pass
0.03000	-53.5	<-28.0	pass
0.10000	-51.2	<-28.0	pass
0.30000	-48.1	<-28.0	pass
1.00000	-44.9	<-28.0	pass
3.00000	-42.5	<-28.0	pass
10.00000	-43.7	<-28.0	pass
30.00000	-42.2	<-28.0	pass
50.00000	-32.9	<-28.0	pass

### 1.3.5 CH2 with >20dB Attenuator

#### Return Loss

Frequency in MHz	Actual in dB	Spec in dB	Verdict
0.00001	-55.4	<-28.0	pass
0.00003	-55.0	<-28.0	pass
0.00010	-55.3	<-28.0	pass
0.00030	-55.4	<-28.0	pass
0.00100	-55.1	<-28.0	pass
0.00300	-55.1	<-28.0	pass
0.01000	-54.8	<-28.0	pass

Frequency in MHz	Actual in dB	Spec in dB	Verdict
0.03000	-53.4	<-28.0	pass
0.10000	-51.1	<-28.0	pass
0.30000	-48.0	<-28.0	pass
1.00000	-44.5	<-28.0	pass
3.00000	-41.2	<-28.0	pass
10.00000	-37.5	<-28.0	pass
30.00000	-38.8	<-28.0	pass
50.00000	-39.3	<-28.0	pass

## 1.4 S21 Calibration

### 1.4.1 External 0dB Reference Attenuator

#### Gain

Frequency in MHz	Actual in dB	Measured in dB	Error in dB	Spec in dB	Of Spec in %	Verdict
0.00001	-0.024	-0.026	-0.002	0.100	-2.3	pass
0.00003	-0.024	-0.025	-0.001	0.100	-1.2	pass
0.00010	-0.024	-0.025	-0.001	0.100	-1.2	pass
0.00030	-0.024	-0.025	-0.001	0.100	-0.9	pass
0.00100	-0.024	-0.025	-0.001	0.100	-1.0	pass
0.00300	-0.024	-0.026	-0.002	0.100	-1.5	pass
0.01000	-0.024	-0.026	-0.002	0.100	-1.7	pass
0.03000	-0.025	-0.026	-0.001	0.100	-0.6	pass
0.10000	-0.028	-0.024	0.004	0.100	3.9	pass
0.30000	-0.032	-0.028	0.004	0.100	3.8	pass
1.00000	-0.041	-0.044	-0.003	0.100	-3.2	pass
3.00000	-0.050	-0.038	0.012	0.100	12.2	pass
10.00000	-0.069	-0.075	-0.006	0.100	-5.6	pass
30.00000	-0.119	-0.126	-0.007	0.100	-7.5	pass
50.00000	-0.150	-0.161	-0.011	0.100	-11.2	pass

#### Phase

Frequency in MHz	Actual in °	Measured in °	Error in m°	Spec in m°	Of Spec in %	Verdict
0.00001	0.000	0.004	4	500	0.9	pass
0.00003	0.000	0.002	2	500	0.5	pass
0.00010	-0.001	0.000	1	500	0.1	pass
0.00030	-0.001	-0.002	-1	500	-0.2	pass
0.00100	-0.002	-0.005	-3	500	-0.5	pass
0.00300	-0.005	-0.009	-3	500	-0.7	pass

Frequency in MHz	Actual in °	Measured in °	Error in m°	Spec in m°	Of Spec in %	Verdict
0.01000	-0.017	-0.016	1	500	0.2	pass
0.03000	-0.050	-0.041	9	500	1.8	pass
0.10000	-0.167	-0.146	21	500	4.3	pass
0.30000	-0.461	-0.443	18	500	3.5	pass
1.00000	-1.425	-1.421	4	500	0.8	pass
3.00000	-4.118	-4.103	15	500	3.0	pass
10.00000	-13.463	-13.451	12	500	2.4	pass
30.00000	-40.091	-40.098	-7	500	-1.4	pass
50.00000	-66.468	-66.542	-74	500	-14.7	pass

#### 1.4.2 External 20dB Reference Attenuator

##### Gain

Frequency in MHz	Actual in dB	Measured in dB	Error in dB	Spec in dB	Of Spec in %	Verdict
0.00001	-20.013	-20.013	0.000	0.100	-0.5	pass
0.00003	-20.013	-20.013	0.000	0.100	0.2	pass
0.00010	-20.013	-20.013	0.000	0.100	0.4	pass
0.00030	-20.013	-20.013	0.000	0.100	0.3	pass
0.00100	-20.013	-20.013	0.000	0.100	-0.1	pass
0.00300	-20.013	-20.015	-0.001	0.100	-1.5	pass
0.01000	-20.014	-20.016	-0.002	0.100	-2.3	pass
0.03000	-20.016	-20.016	-0.001	0.100	-0.5	pass
0.10000	-20.023	-20.015	0.008	0.100	7.7	pass
0.30000	-20.025	-20.019	0.006	0.100	5.7	pass
1.00000	-20.032	-20.037	-0.005	0.100	-5.3	pass
3.00000	-20.044	-20.030	0.013	0.100	13.5	pass
10.00000	-20.061	-20.067	-0.006	0.100	-6.0	pass
30.00000	-20.113	-20.112	0.001	0.100	0.8	pass
50.00000	-20.164	-20.141	0.023	0.100	22.9	pass

##### Phase

Frequency in MHz	Actual in °	Measured in °	Error in m°	Spec in m°	Of Spec in %	Verdict
0.00001	-0.009	0.004	13	500	2.6	pass
0.00003	-0.009	0.001	10	500	2.0	pass
0.00010	-0.010	0.000	10	500	1.9	pass
0.00030	-0.010	-0.006	4	500	0.9	pass
0.00100	-0.011	-0.010	1	500	0.2	pass
0.00300	-0.014	-0.018	-3	500	-0.7	pass



Frequency in MHz	Actual in °	Measured in °	Error in m°	Spec in m°	Of Spec in %	Verdict
0.01000	-0.025	-0.020	5	500	1.1	pass
0.03000	-0.058	-0.044	14	500	2.8	pass
0.10000	-0.170	-0.155	15	500	3.0	pass
0.30000	-0.444	-0.445	-1	500	-0.2	pass
1.00000	-1.404	-1.427	-23	500	-4.7	pass
3.00000	-4.113	-4.118	-5	500	-1.0	pass
10.00000	-13.482	-13.462	20	500	4.0	pass
30.00000	-40.248	-40.151	97	500	19.4	pass
50.00000	-67.015	-66.698	317	500	63.3	pass

### 1.4.3 External 50dB Reference Attenuator

#### Gain

Frequency in MHz	Actual in dB	Measured in dB	Error in dB	Spec in dB	Of Spec in %	Verdict
0.00001	-50.026	-49.908	0.118	0.400	29.4	pass
0.00003	-50.026	-49.907	0.119	0.400	29.6	pass
0.00010	-50.026	-49.906	0.120	0.400	29.9	pass
0.00030	-50.026	-49.909	0.117	0.400	29.3	pass
0.00100	-50.026	-49.921	0.105	0.400	26.2	pass
0.00300	-50.026	-49.965	0.061	0.400	15.3	pass
0.01000	-50.027	-50.011	0.016	0.200	7.8	pass
0.03000	-50.028	-50.019	0.009	0.200	4.7	pass
0.10000	-50.034	-50.018	0.016	0.200	8.2	pass
0.30000	-50.036	-50.025	0.010	0.200	5.2	pass
1.00000	-50.042	-50.040	0.003	0.200	1.3	pass
3.00000	-50.054	-50.033	0.021	0.200	10.3	pass
10.00000	-50.074	-50.074	0.000	0.200	0.2	pass
30.00000	-50.132	-50.120	0.012	0.200	5.8	pass
50.00000	-50.190	-50.153	0.037	0.200	18.3	pass

#### Phase

Frequency in MHz	Actual in °	Measured in °	Error in m°	Spec in m°	Of Spec in %	Verdict
0.00001	-0.02	-0.01	8	1000	0.8	pass
0.00003	-0.02	-0.01	5	1000	0.5	pass
0.00010	-0.02	-0.04	-26	1000	-2.6	pass
0.00030	-0.02	-0.09	-70	1000	-7.0	pass
0.00100	-0.02	-0.22	-201	1000	-20.1	pass
0.00300	-0.02	-0.38	-361	1000	-36.1	pass

Frequency in MHz	Actual in °	Measured in °	Error in m°	Spec in m°	Of Spec in %	Verdict
0.01000	-0.04	-0.22	-185	1000	-18.5	pass
0.03000	-0.07	-0.11	-43	1000	-4.3	pass
0.10000	-0.20	-0.19	7	1000	0.7	pass
0.30000	-0.47	-0.47	-2	1000	-0.2	pass
1.00000	-1.42	-1.44	-25	1000	-2.5	pass
3.00000	-4.13	-4.13	-7	1000	-0.7	pass
10.00000	-13.56	-13.59	-32	1000	-3.2	pass
30.00000	-40.51	-40.58	-68	1000	-6.8	pass
50.00000	-67.46	-67.31	146	1000	14.6	pass

## Appendix

Internally, all values are calculated using full precision. For reporting purposes the values are rounded to a finite number of decimal places. Note that rounding can lead to an inaccurate final decimal digit in the report.

### Nomenclature

<b>DUT:</b>	Device Under Test
<b>Actual:</b>	Value measured by reference equipment
<b>Nominal:</b>	Nominal value output by the DUT or source
<b>Measured:</b>	Value measured by the device under test
<b>Error:</b>	Difference between the actual and nominal/measured value
	DUT output: <b>Error = Actual – Nominal</b>
	DUT input: <b>Error = Measured – Actual</b>
<b>Spec:</b>	Specification, i.e. allowed deviation
<b>Of Spec:</b>	Deviation from the specification in percent
	<b>Of Spec = Error / Spec * 100</b>
<b>Amplitude:</b>	Voltage or current amplitude (not assessed)
<b>Frequency:</b>	Nominal output frequency
<b>Hysteresis:</b>	<b>Hysteresis = Upper Threshold – Lower Threshold</b>
<b>Threshold:</b>	Value measured by reference equipment (upper threshold)
<b>Range:</b>	Range setting for DUT measurement
<b>Verdict:</b>	Evaluation of a measurement result
	no spec    not specified, for information only
	skip        not assessed, because not measured
	pass        calibration / measurement within specification
	fail         calibration / measurement outside specification

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Customers in more than 150 countries rely on the company's ability to supply leading edge technology of excellent quality. Service centers on all continents provide a broad base of knowledge and extraordinary customer support. All of this together with our strong network of sales partners is what has made our company a market leader in the electrical power industry.