



MPE TEST REPORT

Applicant	ABB Engineering (Shanghai) Ltd.
FCC ID	2AX5K-FEW450
Product	AquaMaster4 Flowmeter with Inbuilt Cellular/Wireless Communication
Brand	ABB
Model	AquaMaster 4
Report No.	R2207A0628-M1
Issue Date	January 16, 2023

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC 47 CFR Part 1 1.1310**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2 Test Facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
Address: Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
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1.4 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

2 Description of Equipment Under Test

Client Information

Applicant	ABB Engineering (Shanghai) Ltd.
Applicant address	No.4528, KangXin Highway, PuDong New District, Shanghai, 201319, P.R. China
Manufacturer	ABB Engineering (Shanghai) Ltd.
Manufacturer address	No.4528, KangXin Highway, PuDong New District, Shanghai, 201319, P.R. China

General Technologies

Model	AquaMaster 4
SN	Internal Antenna: 3K672022290152 External Antenna: 3K672022290151
Hardware Version	1.0
Software Version	0
Date of Sample Received	July 22, 2022

Note:

1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.
2. There are 2 kinds of antennas for the products: Internal antenna and external antenna. The products with different antennas are same in electrical and mechanical except antenna part.
3. All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.

3 Maximum Tune Up and Antenna Gain

The numeric gain (G) of the antenna with a gain specified in dB is determined by

Numeric gain (G)=10^{^(antenna gain/10)}

Band	Maximum Tune Up Power		Antenna Gain (Internal Antenna) (dBi)	Antenna Gain (External Antenna) (dBi)	Numeric gain
	(dBm)	(mW)			
WCDMA Band II	23.5	223.872	2.30	1.56	1.698
WCDMA Band IV	23.5	223.872	3.40	1.56	2.188
WCDMA Band V	23.5	223.872	-0.50	2.75	1.884
LTE Band 2	24	251.189	2.30	1.56	1.698
LTE Band 4	24	251.189	3.40	1.56	2.188
LTE Band 12	24	251.189	-2.40	1.59	1.442

4 Test Result

According to section 1.1310 of FCC 47 CFR Part 1, limits for maximum permissible exposure (MPE) are as following

TABLE 1 – LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Note1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational / controlled limits apply provided he or she is made aware of the potential for exposure.

Note2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.



The maximum permissible exposure for 300~1500 MHz is $f/1500$, for 1500~100,000MHz is 1.0. So

Band	The Maximum Permissible Exposure (mW/cm ²)
WCDMA Band II	1.000
WCDMA Band IV	1.000
WCDMA Band V	0.549
LTE Band 2	1.000
LTE Band 4	1.000
LTE Band 12	0.466

**RF Exposure Calculations:**

The following information provides the minimum separation distance for the highest gain antenna provided. This calculation is based on the conducted power, considering maximum power and antenna gain. The formula shown in KDB 447498 D01 is used in the calculation.

Equation from KDB 447498 D01 General RF Exposure Guidance v06 (10/23/2015) is:

$$S = PG / 4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = Time-average maximum tune up procedure (in appropriate units, e.g., mW)

G = the numeric gain of the antenna

R = distance to the center of radiation of the antenna (20 cm = limit for MPE)

Band	Maximum Tune up (dBm)	Maximum Antenna Gain (dBi)	Maximum EIRP (dBm)	PG (mW)	Test Result (mW/cm ²)	Limit Value (mW/cm ²)
WCDMA Band II	23.5	2.30	25.800	380.189	0.076	1.000
WCDMA Band IV	23.5	3.40	26.900	489.779	0.097	1.000
WCDMA Band V	23.5	2.75	26.250	421.697	0.084	0.549
LTE Band 2	24.0	2.30	26.300	426.580	0.085	1.000
LTE Band 4	24.0	3.40	27.400	549.541	0.109	1.000
LTE Band 12	24.0	1.59	25.590	362.243	0.072	0.466
Note: R = 20cm π= 3.1416						

Note: For transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.

*****END OF REPORT *****



ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.