FCC - TEST REPORT

Report Number	:	**68.950.19.0068.01**	Date of Issue:	**March 11, 2019**
Model / HVIN	:	**TEMI S1**		
Product Type	:	Temi Personal Computer Robot		
Applicant	:	Roboteam Home Technology (Shenzhen) Co., Ltd		
Address	:	22F, CHANGFU JINMAO BUILDING NO.5 SHIHUA ROAD, FUTIAN DISTRICT, SHENZHEN, CHINA		
Manufacturer	:	Roboteam Home Technology (Shenzhen) Co., Ltd		
Address	:	22F, CHANGFU JINMAO BUILDING NO.5 SHIHUA ROAD, FUTIAN DISTRICT, SHENZHEN, CHINA		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	**19**		

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2 Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12 & 13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District Shenzhen 518052 P.R. China
Telephone:	86 755 8828 6998
Fax:	86 755 828 5299
FCC Registration No.:	514049
IC Registration No.:	10320A

3 Description of the Equipment Under Test

Product:	Temi Personal Computer Robot
Model no.:	TEMI S1
FCC ID:	2ASJLTEMIS1
Options and accessories:	Charger and power Cable
Rating:	Supplied by 14.4Vdc, 15.6Ah Li-ion Battery 19Vdc, 5.0A Charged by an external adapter
Adapter information:	Adapter Model: AY120BA-ZF190500M Adapter Input: 100-240Vac, 50/60Hz; 1.8A Max Adapter Output: 19.0Vdc, 5.0A
RF Transmission Frequency:	144KHz for WPT 2402MHz-2480MHz for Bluetooth 2412MHz-2462MHz for 802.11b/g/n20 (WiFi) 5150-5350, 5470-5825MHz for 802.11a/n20/n40/ac20/ac40/ac80 (WiFi)
No. of Operated Channel:	79 for Bluetooth 11 for 802.11b/g/n20 (WiFi) 43 for for 802.11a/n20/n40/ac20/ac40/ac80 (WiFi)
Modulation:	GFSK, π/4-DQPSK, 8DPSK for Bluetooth DSSS, OFDM for WiFi
Antenna Type:	Integrated antenna
Antenna Gain:	2.0dBi Max for 2.4GHz 2.5dBi Max for 5GHz
Description of the EUT:	The Equipment Under Test (EUT) supporting wireless power transmission which operated at 144kHz.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2018 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to ANSI C63.10 (2013).

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5 Summary of Test Results

Technical Requirements						
FCC Part 15 Subpart C						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207	Conducted emission AC power port	10	Site 1	☒	☐	☐
--	20dB bandwidth	13	Site 1	☒	☐	☐
§15.205	Restricted bands of operation	13	Site 1	☒	☐	☐
§15.209	Radiated emission	14	Site 1	☒	☐	☐
§15.203	Antenna requirement	See note 1		☒	☐	☐

Note 1: The EUT uses an Integrated coil antenna, which gain is 0dBi. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2ASJLTEMIS1, complies with Section 15.207, 15.209, 15.205 of the FCC Part 15, Subpart C rules.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

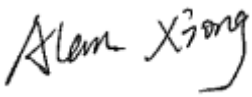
☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: February 25, 2019

Testing Start Date: February 27, 2019

Testing End Date: March 6, 2019

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by:	Prepared by:	Tested by:
		
John Zhi	Alan Xiong	Tree Zhan
Project Manager	Project Engineer	Test Engineer

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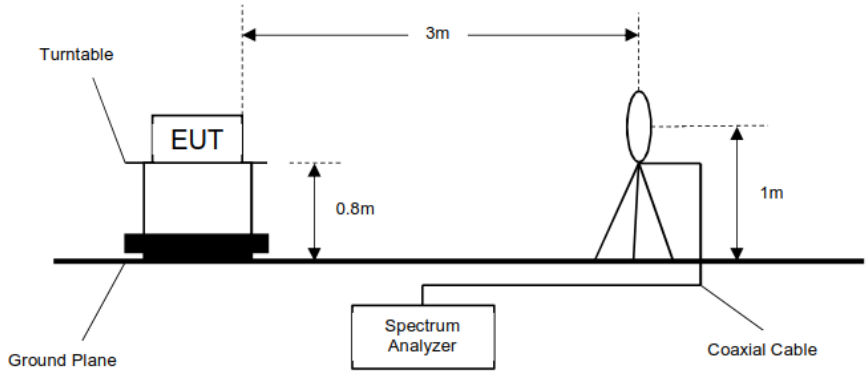
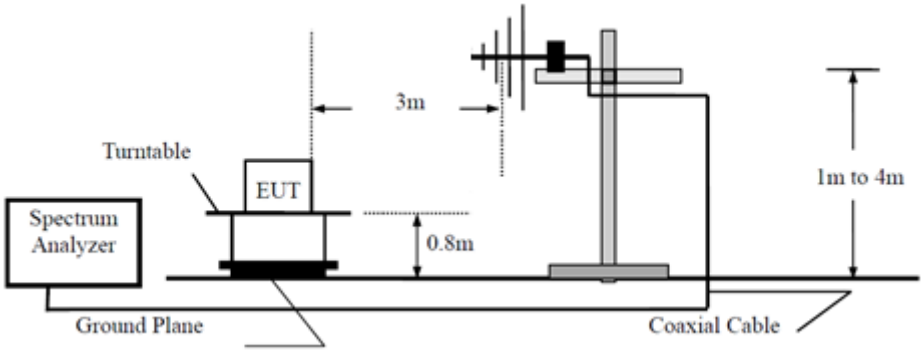
7 Test Setups

7.1 Radiated test setups

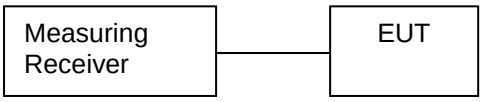
Below 30MHz



30MHz-1GHz



7.2 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

Description	Manufacturer	Model NO.	S/N
Mobile Phone	HUAWEI	---	---

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9 Technical Requirement

9.1 Conducted Emission Test

Test Method

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. Both sides of AC line were checked for maximum conducted interference.
6. The frequency range from 150 kHz to 30 MHz was searched.
7. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

Limit

According to §15.207, conducted emissions limit as below:

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreasing linearly with logarithm of the frequency

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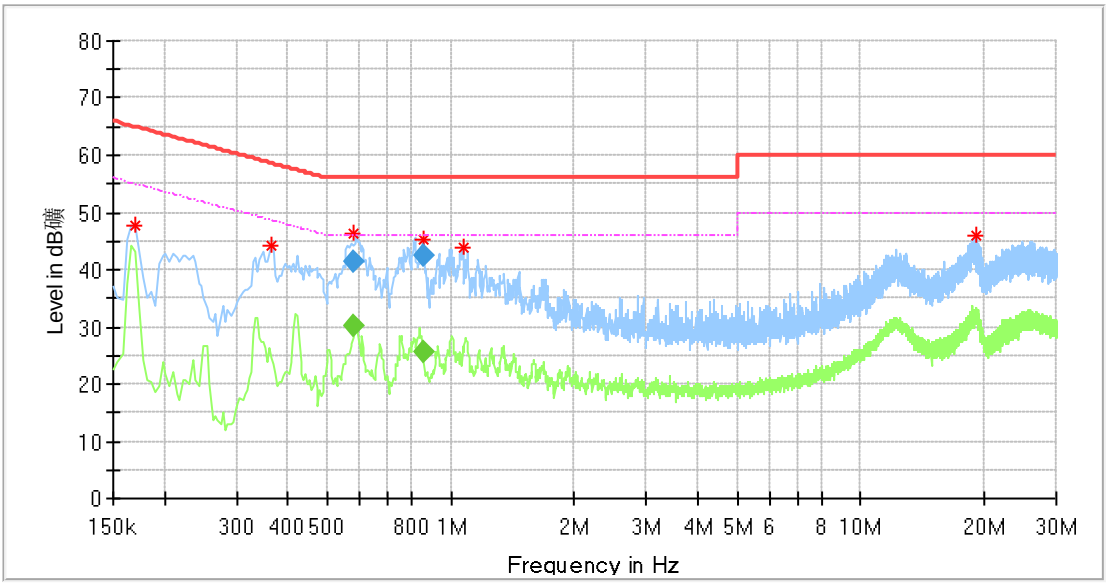
Conducted Emission

Product Type : Temi Personal Computer Robot
M/N : TEMI S1
Operating Condition : Charging Mode
Test Specification : Line
Comment : AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Read Level (dBµV)	Corr. (dB)
0.170000	47.78	---	64.96	17.18	L1	37.58	10.2
0.366000	44.25	---	58.59	14.34	L1	33.95	10.3
0.581500	46.25	---	56.00	9.75	L1	35.95	10.3
0.581500	---	30.23	46.00	15.77	L1	19.93	10.3
0.581500	41.47	---	56.00	14.53	L1	31.17	10.3
0.857500	---	25.67	46.00	20.33	L1	15.37	10.3
1.070000	43.76	---	56.00	12.24	L1	33.46	10.3
19.074000	46.11	---	60.00	13.89	L1	35.11	11.0

Remark:
Max Peak= Read level + Corrector factor
Correct factor=cable loss + LISN factor

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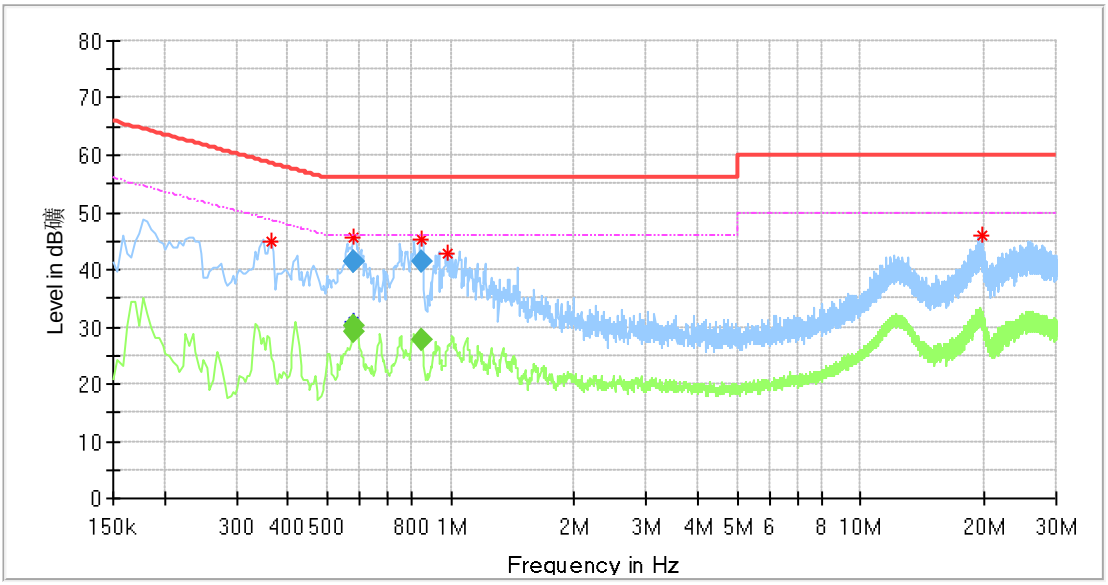
Conducted Emission

Product Type : Temi Personal Computer Robot
M/N : TEMI S1
Operating Condition : Charging Mode
Test Specification : Neutral
Comment : AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Read Level (dBµV)	Corr. (dB)
0.366000	44.75	---	58.59	13.84	N	34.45	10.3
0.577500	---	29.13	46.00	16.87	N	18.83	10.3
0.577500	41.56	---	56.00	14.44	N	31.26	10.3
0.581500	---	30.33	46.00	15.67	N	20.03	10.3
0.581500	41.25	---	56.00	14.75	N	30.95	10.3
0.849500	---	27.67	46.00	18.33	N	17.37	10.3
0.849500	41.28	---	56.00	14.72	N	30.98	10.3
0.982000	42.88	---	56.00	13.12	N	32.58	10.3
19.690000	46.11	---	60.00	13.89	N	34.91	11.2

Remark:
Max Peak= Read level + Corrector factor
Correct factor=cable loss + LISN factor

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9.2 20 dB Bandwidth and 99% Occupied Bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=200Hz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 20 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 20 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]
No Limit

Test result

Frequency	20dB bandwidth	99% bandwidth	Result		Result
KHz	Hz	Hz	F_L (KHz)	F_H (KHz)	
144KHz	955	996	143.65	144.61	Pass

The fundamental frequency is outside the restricted bands of 15.205 section.

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9.3 Radiated Emission Test

Test Method

1: The EUT was place on a turn table which is 0.8m above ground for below 1GHz at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5: Use the following spectrum analyzer settings According to C63.10:

Limit

the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency MHz	Field Strength µ V/m	Field Strength dBµV/m	Detector	Measurement distance meters
0.009-0.490	2400/F(kHz)	48.5-13.8	QP	300
0.490-1.705	24000/F(kHz)	33.8-23.0	QP	30
1.705-30	30	29.5	QP	30
30-88	100	40	QP	3
88-216	150	43.5	QP	3
216-960	200	46	QP	3
960-1000	500	54	QP	3
Above 1000	500	54	AV	3
Above 1000	5000	74	PK	3

Note 1: Limit 3m(dBµV/m)=Limit 300m(dBµV/m)+40Log(300m/3m) (Below 30MHz)
Note 2: Limit 3m(dBµV/m)=Limit 30m(dBµV/m)+40Log(30m/3m) (Below 30MHz)

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Radiated emissions test (9KHz-30MHz)

Frequency Band	Frequency	Emission Level	Read level	Polarization	Limit	Detector	Margin	Correct factor	Result
	MHz	dBµV/m	dBuV/m		dBµV/m		dBµV/m	(dB)	
9KHz-30MHz	0.0090	60.19	39.19	H	93.8	QP	33.61	21.0	Pass
	0.024	59.78	39.78	H	93.8	QP	34.02	20.0	Pass
	0.040	57.40	37.60	H	93.8	QP	36.40	19.8	Pass
	0.056	56.45	36.75	H	93.8	QP	37.35	19.7	Pass
	0.14	74.87	55.17	H	93.8	QP	18.93	19.7	Pass
	0.15	60.51	40.81	H	93.8	QP	33.29	19.7	Pass
	0.20	58.44	38.74	H	93.8	QP	35.36	19.7	Pass
	0.23	58.90	39.20	H	93.8	QP	34.90	19.7	Pass
	0.34	56.10	36.30	H	93.8	QP	37.70	19.8	Pass
	0.47	58.98	39.08	H	93.8	QP	34.82	19.9	Pass
	Other Frequency	--	--	H	93.8	QP	--	--	Pass
	0.0090	53.65	32.65	V	93.8	QP	40.15	21.0	Pass
	0.024	52.01	32.01	V	93.8	QP	41.79	20.0	Pass
	0.040	50.84	31.04	V	93.8	QP	42.96	19.8	Pass
	0.056	49.94	30.24	V	93.8	QP	43.86	19.7	Pass
	0.072	49.27	29.57	V	93.8	QP	44.53	19.7	Pass
	0.088	48.69	28.89	V	93.8	QP	45.11	19.8	Pass
	0.104	53.16	33.36	V	93.8	QP	40.64	19.8	Pass
	0.145	52.87	33.17	V	93.8	QP	40.93	19.7	Pass
	0.165	69.67	49.77	V	93.8	QP	24.13	19.9	Pass
	0.468	59.90	40.20	V	93.8	QP	33.90	19.7	Pass
	Other Frequency	--	--	V	93.8	QP	--	--	Pass

Remark:

(1) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

(2) Corrected Amplitude = Read level + Corrector factor
Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss

(3) All tested frequencies comply for the strictest limit (93.8dBµV/m). so the test result can considered as Pass.

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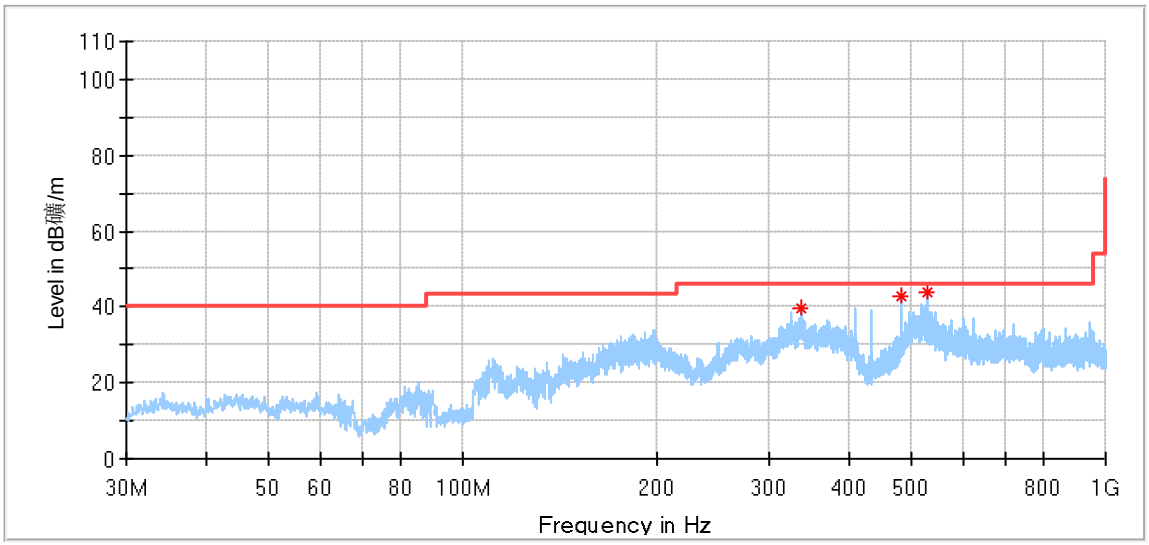
Radiated emissions test (30MHz-1000MHz)

Product Type	:	Temi Personal Computer Robot
M/N	:	TEMI S1
Operating Condition	:	Wireless Charging
Test Specification	:	Horizontal
Comment	:	30MHz-1000MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV /m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Read Level (dBuA/m)	Corr. (dB)
335.765556	39.60	46.00	6.40	---	---	154.0	H	17.0	18.5	21.1
480.080000	42.73	46.00	3.27	---	---	154.0	H	13.0	19.13	23.6
528.041111	43.64	46.00	2.36	---	---	154.0	H	0.0	19.04	24.6

Remark:
Max Peak= Read level + Corrector factor
Corrector factor = Antenna Factor + Cable Loss

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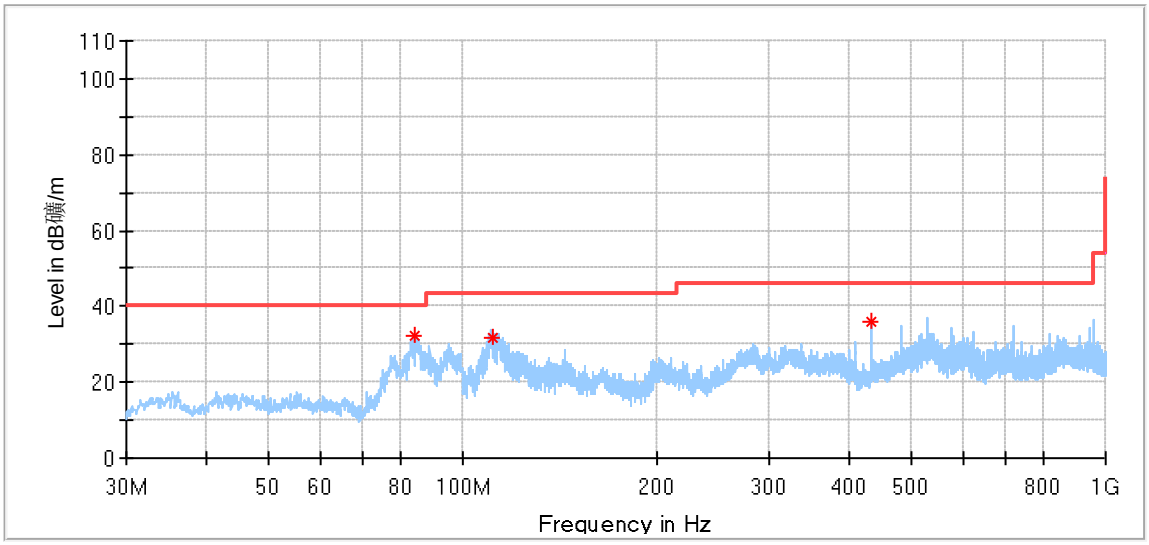
Product Type	:	Temi Personal Computer Robot
M/N	:	TEMI S1
Operating Condition	:	Wireless Charging
Test Specification	:	Vertical
Comment	:	30MHz-1000MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV /m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Read Level (dBuA/m)	Corr. (dB)
83.996667	32.15	40.00	7.85	---	---	154.0	V	132.0	20.65	11.5
111.480000	31.51	43.50	11.99	---	---	154.0	V	201.0	13.61	17.9
432.065000	35.71	46.00	10.29	---	---	154.0	V	0.0	12.91	22.8

Remark:
Max Peak= Read level + Corrector factor
Corrector factor = Antenna Factor + Cable Loss

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10 Test Equipment List

Radiated Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2019-7-6
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2019-7-6
Horn Antenna	Rohde & Schwarz	HF907	102294	2019-7-6
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100398	2019-7-6
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2019-7-6
Signal Generator	Rohde & Schwarz	SMY01	839369/005	2019-7-6
Attenuator	Agilent	8491A	MY39264334	2019-7-6
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

Conducted Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2019-7-6
LISN	Rohde & Schwarz	ENV4200	100249	2019-7-6
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2019-7-6
Test software	Rohde & Schwarz	EMC32	Version9.15.00	N/A

Conducted RF Test System

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2019-7-6

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11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Conducted Emission 150kHz-30MHz (for test using AMN ENV432 or ENV4200)	3.21dB
Uncertainty for Radiated Emission in 3m chamber 9kHz-30MHz	4.46dB
Uncertainty for Radiated Spurious Emission 25MHz-3000MHz	Horizontal: 4.91dB; Vertical: 4.89dB;
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.16dB Frequency test involved: 0.6×10^{-7} or 1%

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