

FCC - TEST REPORT

Report Number : **68.760.19.0350.01** Date of Issue: **July 27, 2019**

Model : **TC03**

Product Type : Wireless charger

Applicant : Matrix Industries, Inc.

Address : 1455 Adams Dr, Suite 1190 Menlo Park, CA 94025, USA

Production Facility : Matrix Industries, Inc.

Address : 1455 Adams Dr, Suite 1190 Menlo Park, CA 94025, USA

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including
Appendices : **18**

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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 8828 5299

FCC Registration No.: 514049

FCC Designation Number: CA5009

IC Registration No.: 10320A

3. Description of the Equipment Under Test

Product:	Wireless charger
Model no.:	TC03
FCC ID:	2ANY2MTC03
Options and accessories:	N/A
Rating:	5Vdc 1.0A Max supplied by an external adapter
RF Transmission Frequency:	117-175KHz
Antenna Type:	Integrated coil antenna
Description of the EUT:	The Equipment Under Test (EUT) is a wireless charger which operated at 117-175kHz.

4. Summary of Test Standards

Test Standards	
FCC Part 18 10-1-18 Edition	Industrial, Scientific, and Medical equipment

5. Summary of Test Results

Technical Requirements			
FCC Part 18 10-1-17 Edition			
Test Condition		Pages	Test Result
§18.307	Conducted emission AC power port	10	Pass
§18.301	Operating frequencies	--	N/A
§18.305	Field strength	13	Pass
§18.309	Frequency range	See note 2	Pass
§18.303	Prohibited frequency bands	See note 3	Pass

Note 1: N/A=Not Applicable.

Note 2: Because the highest frequency of the internal sources of the EUT is less than 108MHz, so the measurement only is made up to 1GHz.

Note 3: The fundamental frequency of this product is 117-175KHz. Outside the band specified of §18.303, it is considered sufficiently to comply with the provisions of this section.

6. General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2ANY2MTC03, complies with FCC Part 18.

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: June 20, 2019

Testing Start Date: July 2, 2019

Testing End Date: July 24, 2019

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

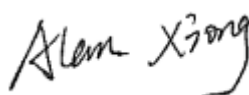
Reviewed by:

Prepared by:

Tested by:



John Zhi
Project Manager



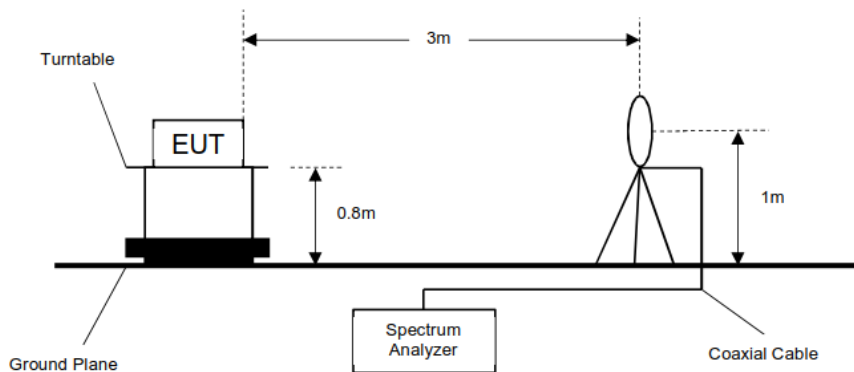
Alan Xiong
Project Engineer



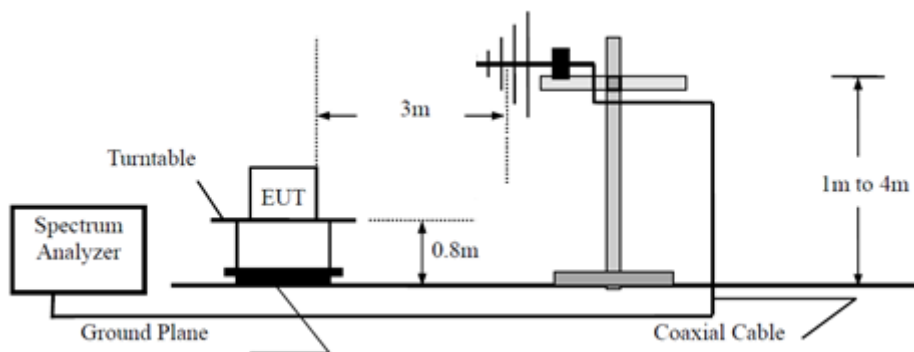
Tree Zhan
Test Engineer

7. Test Setups

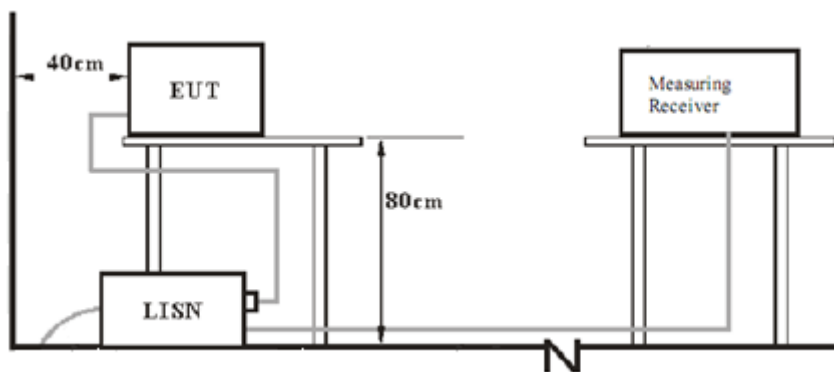
Below 30MHz



30MHz-1GHz



AC Power Line Conducted Emission test setups



8. Systems test configuration

Auxiliary Equipment Used during Test:

Description	Manufacturer	Model NO.	S/N
PowerWatch Series 2	Matrix	PW07	---
Adapter	Apple	A1357	---

Description	Length	Shielded/unshielded	With / without ferrite
USB Cable	0.15m	Shielded	Without ferrite

9. Technical Requirement

9.1 Conducted Emission Test

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through an Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. An EMI test receiver is used to test the emissions from both sides of AC line

Limit

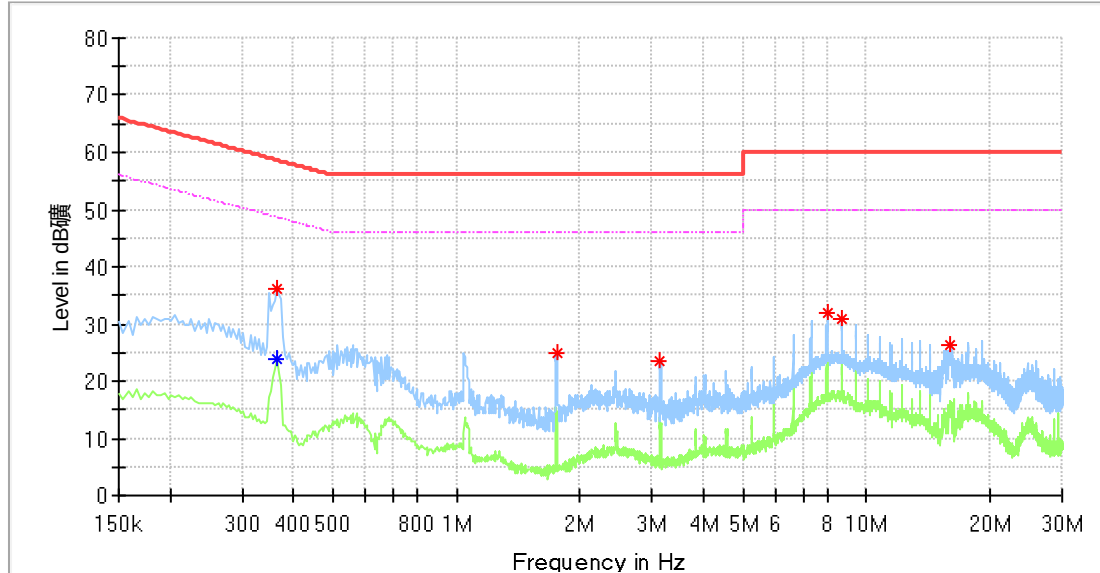
According to §18.307, conducted emissions limit as below:

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

*Decreasing linearly with logarithm of the frequency

Conducted Emission

Product Type : Wireless charger
 M/N : TC03
 Operating Condition : Charging Mode
 Test Specification : Line
 Comment : AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBμV)*	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)**
0.366000	---	23.70	48.59	24.89	L1	10.3
0.366000	36.19	---	58.59	22.40	L1	10.3
1.754000	24.77	---	56.00	31.23	L1	10.3
3.134000	23.48	---	56.00	32.52	L1	10.4
8.022000	32.05	---	60.00	27.95	L1	10.6
8.718000	30.83	---	60.00	29.17	L1	10.6
16.014000	26.16	---	60.00	33.84	L1	10.8

Remark :

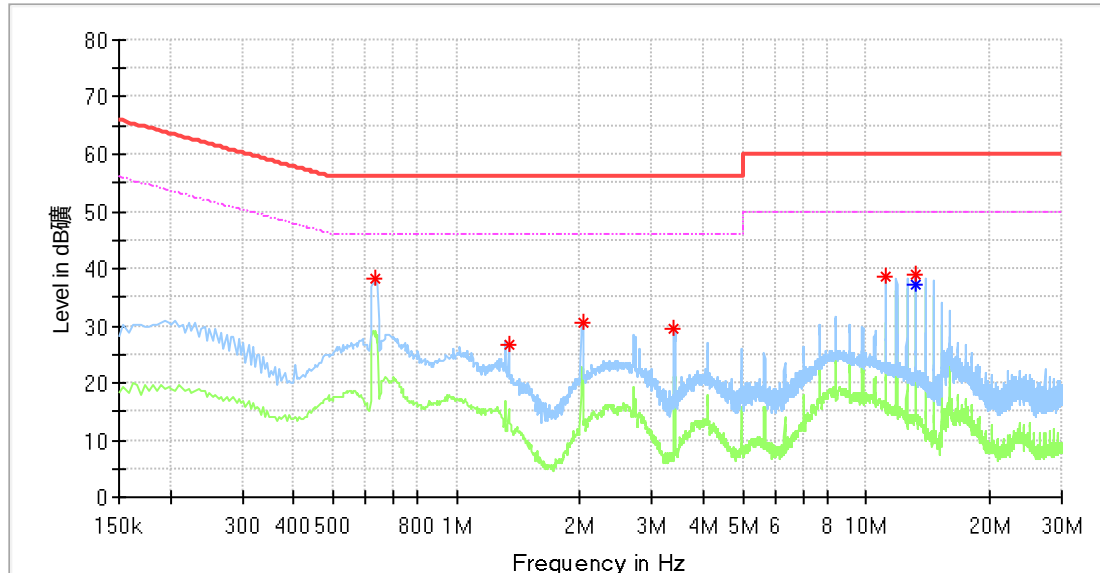
*Level=Reading Level + Correction Factor

**Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

Conducted Emission

Product Type : Wireless charger
 M/N : TC03
 Operating Condition : Charging Mode
 Test Specification : Neutral
 Comment : AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBμV) *	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB) **
0.634000	38.19	---	56.00	17.81	N	10.3
1.338000	26.68	---	56.00	29.32	N	10.3
2.030000	30.49	---	56.00	25.51	N	10.3
3.402000	29.41	---	56.00	26.59	N	10.4
11.162000	38.72	---	60.00	21.28	N	10.7
13.254000	38.88	---	60.00	21.12	N	10.8
13.254000	---	37.24	50.00	12.76	N	10.8

Remark :

*Level=Reading Level + Correction Factor

**Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

9.2 Radiated Emission Test for 9KHz-30MHz

Test Method

1: Field strength measurements are made in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna as specified in ANSI C63.4 clause 4.5.2, positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. This method is applicable for radiated radio-noise measurements from all units, cables, power cords, and interconnect cabling or wiring.

2: For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

Limits

According to §18.307, Field strength limit as below:

Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit (uV/m)	Distance (meters)
Any type unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 $25 \times \text{SQRT}(\text{power}/500)$	300 ¹ 300
	Any non-ISM frequency	Below 500 500 or more	15 $15 \times \text{SQRT}(\text{power}/500)$	300 ¹ 300
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz Above 5,725 MHz	Any Any	10 (²)	1,600 (²)
Medical diathermy	Any ISM frequency Any non-ISM frequency	Any Any	25 15	300 300
Ultrasonic	Below 490 kHz	Below 500 500 or more	2,400/F(kHz) $2,400/F(\text{kHz}) \times \text{SQRT}(\text{power}/500)$	300 ³ 300
	490 to 1,600 kHz Above 1,600 kHz	Any Any	24,000/F(kHz) 15	30 30
Induction cooking ranges	Below 90 kHz	Any	1,500	⁴ 30
	On or above 90 kHz	Any	300	⁴ 30
¹ Field strength may not exceed 10 µV/m at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts. ² Reduced to the greatest extent possible. ³ Field strength may not exceed 10 µV/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts. ⁴ Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.				

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

Note 2: Limit 3m(dBµV/m)=Limit 300m(dBµV/m)+20Log(300m/3m) (Above 30MHz)

Note 3: this product is a wireless charger which operated at 117-175kHz. So, it belongs to miscellaneous with non-SIM frequency.

Radiated Emission for 9KHz-30MHz

Product Type : Wireless charger
M/N : TC03
Operating Condition : Charging Mode
Comment : 9KHz-30MHz

Frequency Band	Frequency	Emission Level*	Polarization	Limit	Detector	Margin	Correct factor**	Result
	MHz	dBμV/m		dBμV/m		dBμV/m	(dB)	
9KHz-30MHz	0.119120	60.05	H	93.8	QP	32.75	19.7	Pass
	0.154975	50.35	H	93.8	QP	43.45	19.7	Pass
	0.164925	44.36	H	93.8	QP	49.44	19.7	Pass
	0.199750	44.39	H	93.8	QP	49.41	19.7	Pass
	0.229600	44.42	H	93.8	QP	49.38	19.7	Pass
	0.294275	44.35	H	93.8	QP	49.45	19.7	Pass
	0.324125	44.59	H	93.8	QP	49.21	19.8	Pass
	Other frequency	--	H	93.8	QP	--	--	Pass
	0.119120	55.05	V	93.8	QP	37.75	19.7	Pass
	0.154975	47.77	V	93.8	QP	46.03	20.8	Pass
	0.179850	32.89	V	93.8	QP	60.91	19.7	Pass
	0.214675	30.35	V	93.8	QP	63.45	19.7	Pass
	Other frequency	--	V	93.8	QP	--	--	Pass

Remark :

*Level=Reading Level + Correction Factor

**Correction Factor=Antenna Factor + Cable Loss

(The Reading Level is recorded by software which is not shown in the sheet)

9.3 Radiated Emission Test for 30MHz-1GHz

Test Method

- 1: The EUT was placed 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 C63.4:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz, VBW ≥ RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.

Limits

According to §18.307, Field strength limit as below:

Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit (μV/m)	Distance (meters)
Any type unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 $25 \times \text{SQRT}(\text{power}/500)$	300 ¹ 300
	Any non-ISM frequency	Below 500 500 or more	15 $15 \times \text{SQRT}(\text{power}/500)$	300 ¹ 300
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz Above 5,725 MHz	Any Any	10 (²)	1,600 (²)
Medical diathermy	Any ISM frequency Any non-ISM frequency	Any Any	25 15	300 300
Ultrasonic	Below 490 kHz	Below 500 500 or more	$2,400/F(\text{kHz})$ $2,400/F(\text{kHz}) \times \text{SQRT}(\text{power}/500)$	300 ³ 300
	490 to 1,600 kHz	Any	$24,000/F(\text{kHz})$	30
	Above 1,600 kHz	Any	15	30
Induction cooking ranges	Below 90 kHz	Any	1,500	⁴ 30
	On or above 90 kHz	Any	300	⁴ 30
¹ Field strength may not exceed 10 μV/m at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts. ² Reduced to the greatest extent possible. ³ Field strength may not exceed 10 μV/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts. ⁴ Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.				

Note 1: Limit $3\text{m}(\text{dB}\mu\text{V}/\text{m}) = \text{Limit } 300\text{m}(\text{dB}\mu\text{V}/\text{m}) + 40\text{Log}(300\text{m}/3\text{m})$ (Below 30MHz)

Note 2: Limit $3\text{m}(\text{dB}\mu\text{V}/\text{m}) = \text{Limit } 300\text{m}(\text{dB}\mu\text{V}/\text{m}) + 20\text{Log}(300\text{m}/3\text{m})$ (Above 30MHz)

Note 3: this product is a wireless charger which operated at 90kHz without data transmission. So, it belongs to miscellaneous with non-SIM frequency.

Radiated Emission

Product Type : Wireless Quick Charger
M/N : CP60
Operating Condition : Charging Mode
Comment : 30-1000MHz

Frequency Band	Frequency MHz	Emission Level* dBμV/m	Polarization	Limit dBμV/m	Detector	Margin dBμV/m	Correct factor** (dB)	Rusult
30MHz-1000MHz	46.065625	20.97	H	63.52	QP	42.55	17.4	Pass
	112.268125	17.47	H	63.52	QP	46.05	15.3	Pass
	185.988125	21.04	H	63.52	QP	42.48	15.0	Pass
	457.042500	27.14	H	63.52	QP	36.38	23.2	Pass
	719.609375	32.26	H	63.52	QP	31.26	27.6	Pass
	949.256875	35.12	H	63.52	QP	28.40	30.8	Pass
	46.853750	28.58	V	63.52	QP	34.94	18.0	Pass
	80.500625	24.42	V	63.52	QP	39.10	11.9	Pass
	99.961250	26.29	V	63.52	QP	37.23	16.4	Pass
	120.998125	25.26	V	63.52	QP	38.26	14.5	Pass
	170.710625	31.13	V	63.52	QP	32.39	13.9	Pass
	196.900625	35.09	V	63.52	QP	28.43	16.2	Pass

Remark :

*Level=Reading Level + Correction Factor

**Correction Factor=Antenna Factor + Cable Loss

(The Reading Level is recorded by software which is not shown in the sheet)

10. Test Equipment List

Radiated Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2020-6-28
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2020-6-28
Horn Antenna	Rohde & Schwarz	HF907	102294	2020-6-22
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100398	2020-7-7
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2020-6-28
Signal Generator	Rohde & Schwarz	SMY01	839369/005	2020-6-28
Attenuator	Agilent	8491A	MY39264334	2020-6-28
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7

Conducted Emission Test

Description	Manufacturer	Model no.	Serial no.	cal. due date
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2020-6-28
LISN	Rohde & Schwarz	ENV432	101318	2020-3-20
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2020-6-28
Test software	Rohde & Schwarz	EMC32	Version9.15.00	N/A

11. Measurement System 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	
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 Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.91dB; Vertical: 4.89dB;