Microtest
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Test Report

Report No.:	MTi240321009-04E1
Date of issue:	2024-04-02
Applicant:	Electronic Silk Road (Shenzhen) Tech Co., Ltd
Product:	ESR 15W Car Charger with MagSafe+ CryoBoost
Model(s):	2B513
FCC ID:	2APEW-2B513

Shenzhen Microtest Co., Ltd.

http://www.mtitest.com

Address: Headquarters: Microtest Hi-tech Building, Zone 2, Xinxing Industrial Park, Fuzhou Avenue, Bao'an District, Shenzhen, China.
Tel: (86-755)88850135 Fax: (86-755) 88850136 Web: www.mtitest.cn E-mail: mti@51mti.com

Instructions

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2. The test results in this test report are only responsible for the samples submitted

3. This test report is invalid without the seal and signature of the laboratory.

4. This test report is invalid if transferred, altered, or tampered with in any form without authorization.

5. Any objection to this test report shall be submitted to the laboratory within 15 days from the date of receipt of the report.

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Test Result Certification	
Applicant:	**Electronic Silk Road (Shenzhen) Tech Co., Ltd**
Address:	439, Building A7, Fuhai Xinxigang, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Manufacturer:	**Electronic Silk Road (Shenzhen) Tech Co., Ltd**
Address:	439, Building A7, Fuhai Xinxigang, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Product description	
Product name:	ESR 15W Car Charger with MagSafe+ CryoBoost
Trademark:	ESR
Model name:	2B513
Series Model:	N/A
Standards:	FCC 47 CFR Part 15 Subpart C
Test method:	ANSI C63.10-2013
Date of Test	
Date of test:	2023-05-24 ~ 2023-06-16 2024-03-29 ~ 2024-04-01
Test result:	Pass

EUT added the control chip ETA7906, retested the radiation spurious (Below 1GHz), and replaced the EUT photo. the other test data is based on the original test report MTi230522009-01E1, date 2023-06-16.

Test Engineer : Letter. Lan.

(Letter Lan)

Reviewed By: David. Lee

(David Lee)

Approved By: Leon chen

(Leon Chen)

1. General Description

1.1 Description of the EUT

Product name:	ESR 15W Car Charger with MagSafe+ CryoBoost
Model name:	2B513
Series Model:	N/A
Model difference:	N/A
Electrical rating:	Input: DC 9V/3A Wireless Output: 15W
Accessories:	1. Type-C to Type-C cable 100cm
Hardware version:	V1.1
Software version:	V1.0
Test sample(s) number:	MTi230522009-01S1001 MTi240321009-04S1001
RF specification:	
Operation frequency:	360 kHz
Modulation type:	ASK
Antenna type:	Coil Antenna

1.2 Description of test modes

All the test modes were carried out with the EUT in normal operation, the final test mode of the EUT was the worst test mode for emission test, which was shown in this report and defined as:

No.	Emission test modes
Mode 1	Wireless Output(15W)
Mode 2	Stand-by
The worst test mode of conducted emissions: Mode 1 **The worst test mode of radiated emissions:** Mode 1	

1.3 Description of support units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support equipment list			
Description	Model	Serial No.	Manufacturer
iPhone	iPhone 13	MGYJ0HNQHL	Apple
Adapter(White)	HW-090200CH0	/	Huizhou BYD Electronics Co., Ltd.
Adapter(Black)	HW-090200CH0	/	Huizhou BYD Electronics Co., Ltd.
Support cable list			
Description	Length (m)	From	To
/	/	/	/

1.4 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15ºC~35ºC
Humidity:	20 % RH ~ 75 % RH
Atmospheric pressure:	98 kPa~101 kPa

2. Measurement uncertainty

Measurement	Uncertainty
Conducted emission (9 kHz~30 MHz)	± 2.5 dB
Radiated emission (9 kHz ~ 30 MHz)	± 4.0dB
Radiated emission (30 MHz~1 GHz)	± 4.2 dB
Radiated emission (above 1 GHz)	± 4.3 dB
Occupied bandwidth	± 3 %
Temperature	±1 degree
Humidity	± 5 %

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. Test laboratory

Test laboratory:	Shenzhen Microtest Co., Ltd.
Test site location:	101, No.7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Telephone:	(86-755)88850135
Fax:	(86-755)88850136
CNAS Registration No.:	CNAS L5868
FCC Registration No.:	448573

4. Summary of Test Result

No.	FCC reference	Description of test	Result
Emission			
1	FCC Part 15.203	Antenna requirement	Pass
2	FCC Part 15.207	AC power line Conducted emissions	Pass
3	FCC Part 15.209	Radiated emissions	Pass
4	FCC Part 15.215	Occupied bandwidth	Pass

5. List of test equipment

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
MTi-E043	EMI test receiver	R&S	ESCI7	101166	2023/04/26	2024/04/25
MTi-E044	Broadband antenna	Schwarzbeck	VULB9163	9163-1338	2021/05/30	2024/05/29
MTi-E045	Horn antenna	Schwarzbeck	BBHA9120D	9120D-2278	2021/05/30	2024/05/29
MTi-E046	Active Loop Antenna	Schwarzbeck	FMZB 1519 B	00066	2021/05/30	2024/05/29
MTi-E047	Pre-amplifier	Hewlett-Packard	8447F	3113A06184	2023/04/26	2024/04/25
MTi-E048	Pre-amplifier	Agilent	8449B	3008A01120	2023/05/04	2024/05/03
MTi-E005	EMI test receiver	R&S	ESPI7	100314	2023/04/26	2024/04/25
MTi-E120	Broadband antenna	Schwarzbeck	VULB9163	9163-1419	2021/05/30	2024/05/29
MTi-E121	Pre-amplifier	Hewlett-Packard	8447D	2944A09365	2023/05/04	2024/05/03
MTi-E123	Pre-amplifier	Agilent	8449B	3008A04723	2023/05/04	2024/05/03
MTi-E001	Artificial Mains Network	R&S	ESH2-Z5	100263	/	/
MTi-E002	EMI Test Receiver	R&S	ESCI3	101368	2023/04/26	2024/04/25
MTi-E023	Artificial power network	Schwarzbeck	NSLK8127	NSLK8127# 841	2023/05/04	2024/05/03
MTi-E025	Artificial power network	Schwarzbeck	NSLK8127	8127183	2023/04/26	2024/04/25
MTi-E026	8-wire Impedance Stabilization Network	Schwarzbeck	NTFM 8158	NTFM 8158 #199	2023/04/26	2024/04/25
MTi-E043	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2023/04/26	2024/04/25
MTi-E024	Artificial power network	Schwarzbeck	NSLK8127	01001	2023/05/06	2024/05/05

Note: the calibration interval of the test equipment is 12 or 24 months and the calibrations are traceable to international system unit(SI)

6. Test Results

6.1 Antenna requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Description of the EUT antenna

The antenna of EUT is coil antenna, which is integrated on the main PCB of the EUT and no consideration of replacement.

6.2 AC power line conducted emissions

6.2.1 Limits

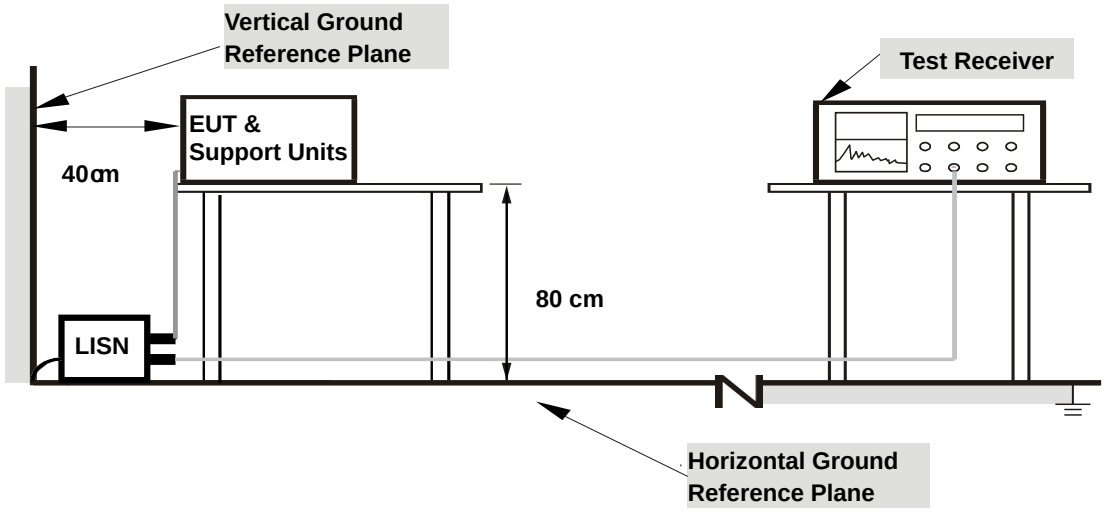
Frequency (MHz)	Detector type / Bandwidth	Limit-Quasi-peak dBµV	Limit-Average dBµV
0.15 -0.5	Average / 9 kHz	66 to 56	56 to 46
0.5 -5		56	46
5 -30		60	50

Note 1: the limit decreases with the logarithm of the frequency in the range of 0.15 MHz to 0.5 MHz.

6.2.2 Test Procedures

a) The test setup is refer to the standard ANSI C63.10-2013.
b) The EUT is connected to the main power through a line impedance stabilization network (LISN). All support equipment is powered from additional LISN(s).
c) Emissions were measured on each current carrying line of the EUT using an EMI test receiver connected to the LISN powering the EUT.
d) The test receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes described in Item 1.2.
e) The test data of the worst-case condition(s) was recorded.

6.2.3 Test setup

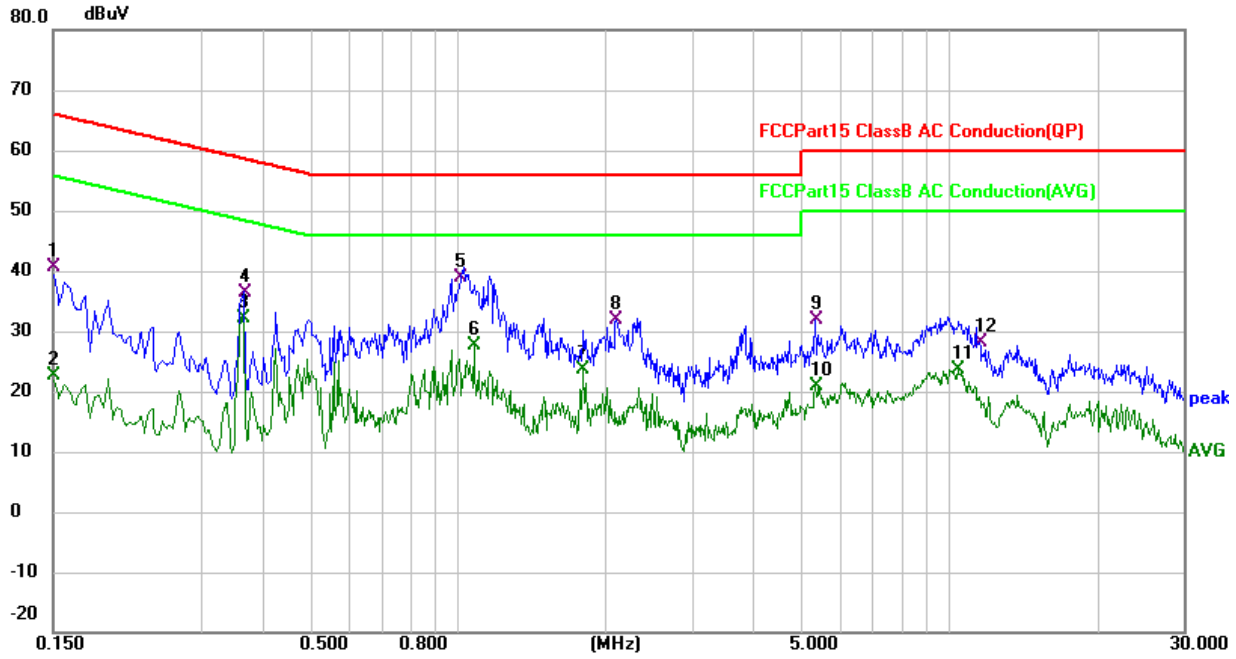


For the actual test configuration, please refer to the related item – Photographs of the test setup.

6.2.4 Test Result

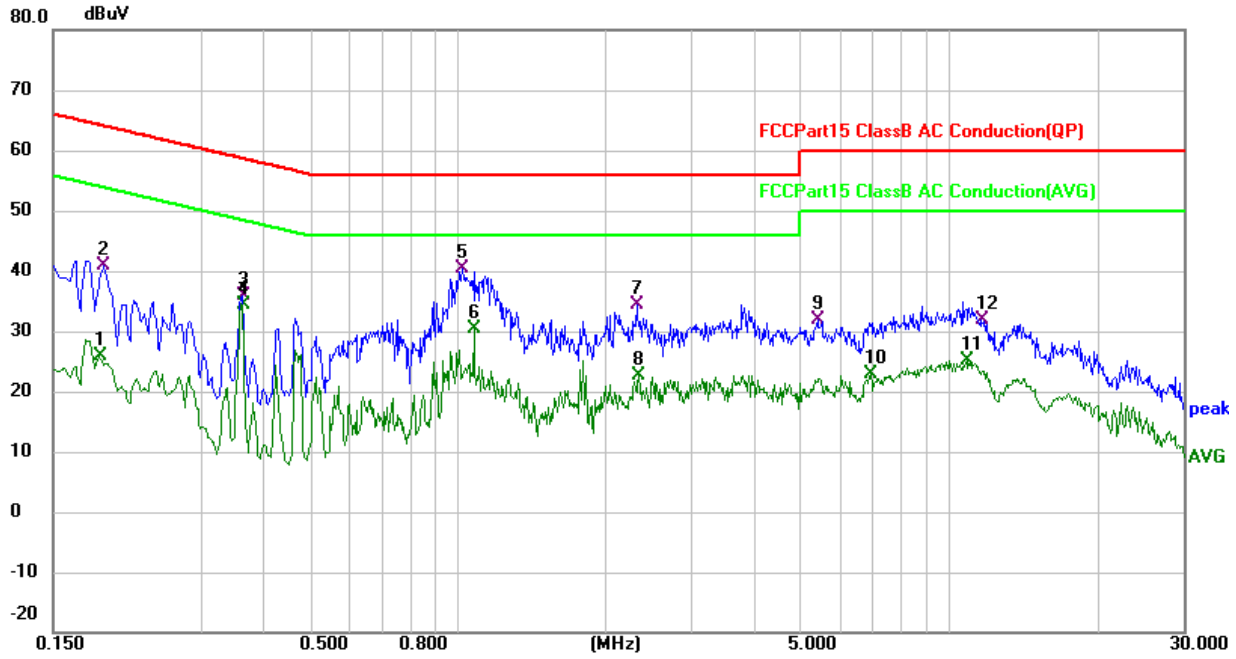
Calculation formula:
Measurement (dBµV) = Reading Level (dBµV) + Correct Factor (dB)
Over (dB) = Measurement (dBµV) – Limit (dBµV)

Test mode:	Mode 1	Phase:	L
Power supply:	Powered by AC/DC adapter (AC 120V/60Hz)	Test site:	CE chamber 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1500	30.24	10.28	40.52	66.00	-25.48	QP
2		0.1500	12.24	10.28	22.52	56.00	-33.48	AVG
3	*	0.3620	21.04	11.01	32.05	48.68	-16.63	AVG
4		0.3660	25.47	11.03	36.50	58.59	-22.09	QP
5		1.0140	26.46	12.42	38.88	56.00	-17.12	QP
6		1.0820	15.10	12.54	27.64	46.00	-18.36	AVG
7		1.8020	9.86	13.68	23.54	46.00	-22.46	AVG
8		2.1099	21.77	10.03	31.80	56.00	-24.20	QP
9		5.3340	21.61	10.27	31.88	60.00	-28.12	QP
10		5.3340	10.67	10.27	20.94	50.00	-29.06	AVG
11		10.4180	13.25	10.41	23.66	50.00	-26.34	AVG
12		11.5060	17.61	10.44	28.05	60.00	-31.95	QP

Test mode:	Mode 1	Phase:	N
Power supply:	Powered by AC/DC adapter (AC 120V/60Hz)	Test site:	CE chamber 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1860	15.25	10.60	25.85	54.21	-28.36	AVG
2		0.1900	30.34	10.60	40.94	64.04	-23.10	QP
3		0.3620	24.80	10.96	35.76	58.68	-22.92	QP
4	*	0.3620	23.51	10.96	34.47	48.68	-14.21	AVG
5		1.0220	27.94	12.37	40.31	56.00	-15.69	QP
6		1.0820	17.77	12.50	30.27	46.00	-15.73	AVG
7		2.3100	24.08	10.41	34.49	56.00	-21.51	QP
8		2.3420	12.26	10.41	22.67	46.00	-23.33	AVG
9		5.4020	21.53	10.28	31.81	60.00	-28.19	QP
10		6.9300	12.57	10.28	22.85	50.00	-27.15	AVG
11		10.8979	14.84	10.34	25.18	50.00	-24.82	AVG
12		11.6660	21.50	10.37	31.87	60.00	-28.13	QP

6.3 Radiated emissions

6.3.1 Limits

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note 1: the tighter limit applies at the band edges.
Note 2: the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector

§ 15.35 (b) requirements:

When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, e.g., see §§ 15.250, 15.252, 15.253(d), 15.255, 15.256, and 15.509 through 15.519, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

According to ANSI C63.10, the tests shall be performed in the frequency range shown in the following table:

Frequency range of measurements for unlicensed wireless device

Lowest frequency generated in the device	Upper frequency range of measurement
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz, whichever is lower
At or above 10 GHz to below 30 GHz	5th harmonic of highest fundamental frequency or to 100 GHz, whichever is lower
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified

Frequency range of measurements for unlicensed wireless device with digital device

Highest frequency generated or used in the device or on which the device operates or tunes	Upper frequency range of measurement
Below 1.705 MHz	30 MHz
1.705 MHz to 108 MHz	1000 MHz
108 MHz to 500 MHz	2000 MHz
500 MHz to 1000 MHz	5000 MHz
Above 1000 MHz	5th harmonic of the highest frequency or 40 GHz, whichever is lower

Test instrument setup

Frequency	Test receiver / Spectrum analyzer setting
9 kHz ~ 150 kHz	Quasi Peak / 200 Hz
150 kHz ~ 30 MHz	Quasi Peak / 9 kHz
30 MHz ~ 1 GHz	Quasi Peak / 120 kHz

6.3.2 Test Procedures

The EUT is placed on a non-conducting table 80cm above the ground plane for measurement below 1 GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10-2013.

For measurement below 1 GHz, the resolution bandwidth is set as item 5.4.2.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned form 1 to 4m meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and horizontal positions.

Special requirements for 9 kHz to 30 MHz:

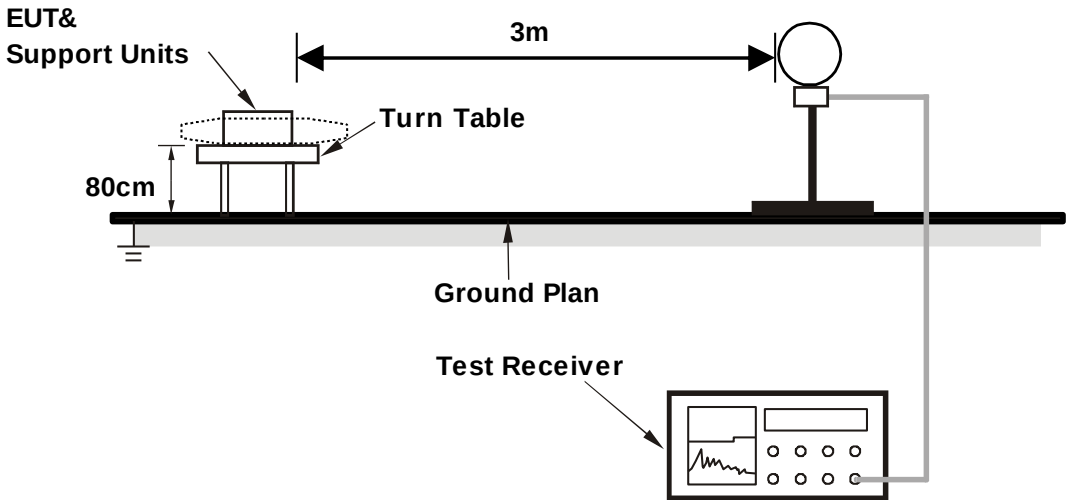
The lowest height of the magnetic antenna shall be 1 m above the ground

When the EUT contains a loop antenna that can only be placed in a vertical axis, normal measurements shall be made aligning the measurement antenna along the site axis, and then orthogonal to the axis. For each measurement antenna alignment, the EUT shall be rotated through 0° to 360° on a turntable.

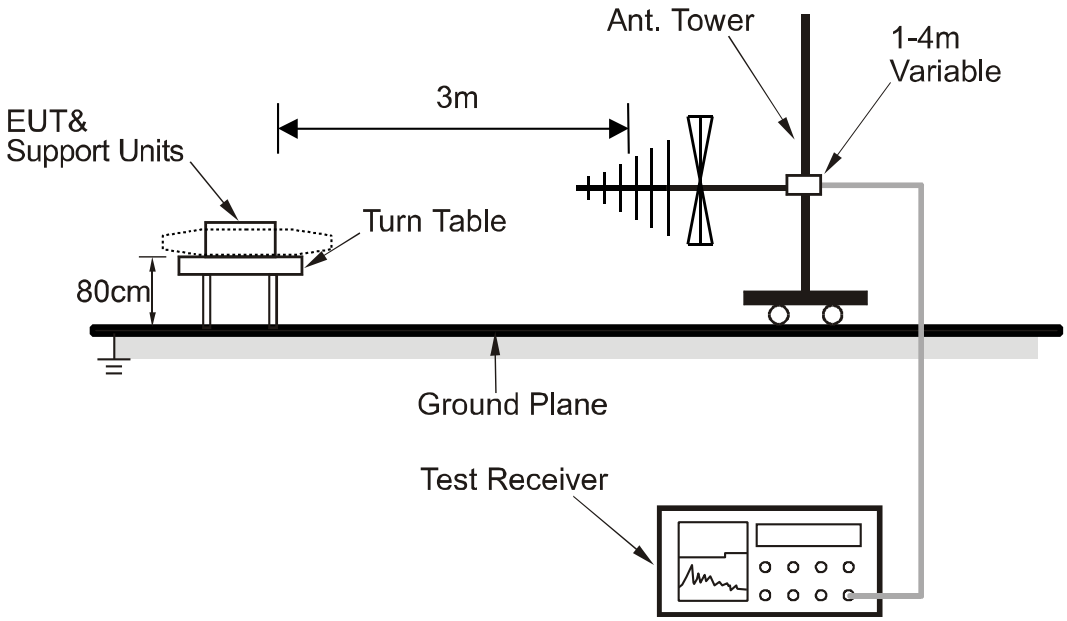
When the EUT contains a loop antenna that can be placed in a horizontal or vertical axis, normal measurements shall be made aligning the measurement antenna along the site axis, orthogonal to the axis, and then with the measurement antenna horizontal. For each measurement antenna alignment, the EUT shall be rotated through 0° to 360° on a turntable.

6.3.3 Test Setup

Below 30 MHz:



Below 1 GHz:



For the actual test configuration, please refer to the related item – Photographs of the test setup.

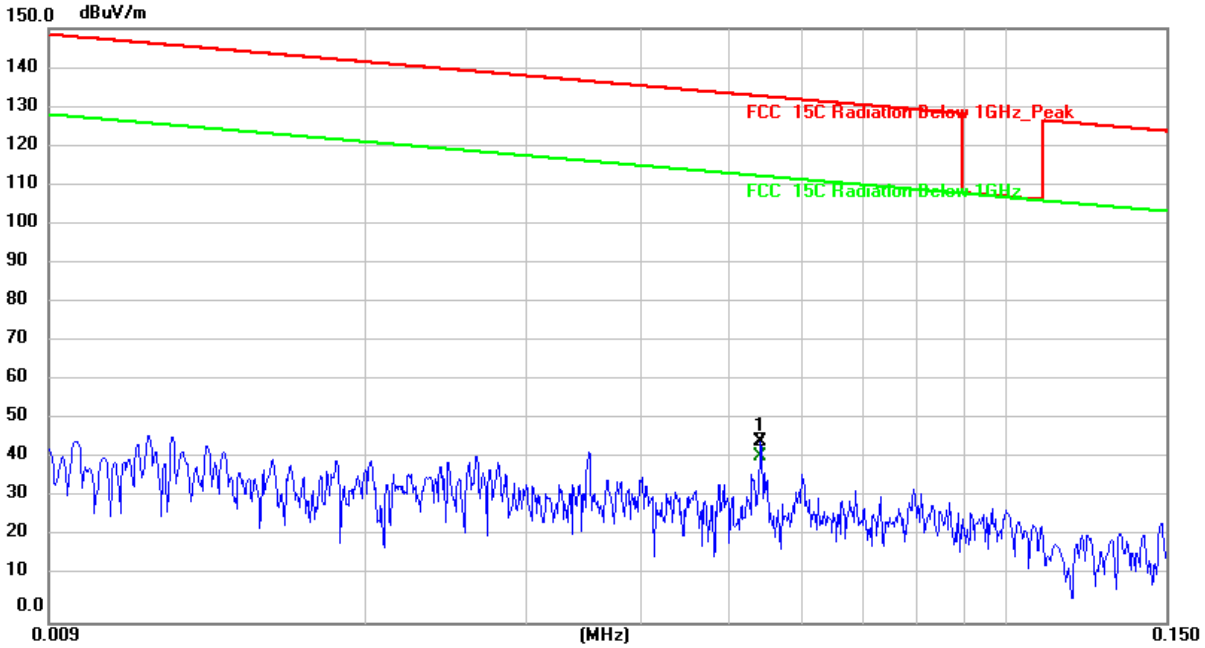
6.3.4 Test result

Calculation formula:
Measurement (dBμV/m) = Reading Level (dBμV) + Correct Factor (dB/m)
Over (dB) = Measurement (dBμV/m) – Limit (dBμV/m)

Note: For 9 kHz - 30 MHz testing, all the required orthogonal orientations of the measurement loop antenna were performed for pre-scan, the maximum radiated transmissions (Site axis) were recorded.

Frequency 9 kHz ~ 150 kHz

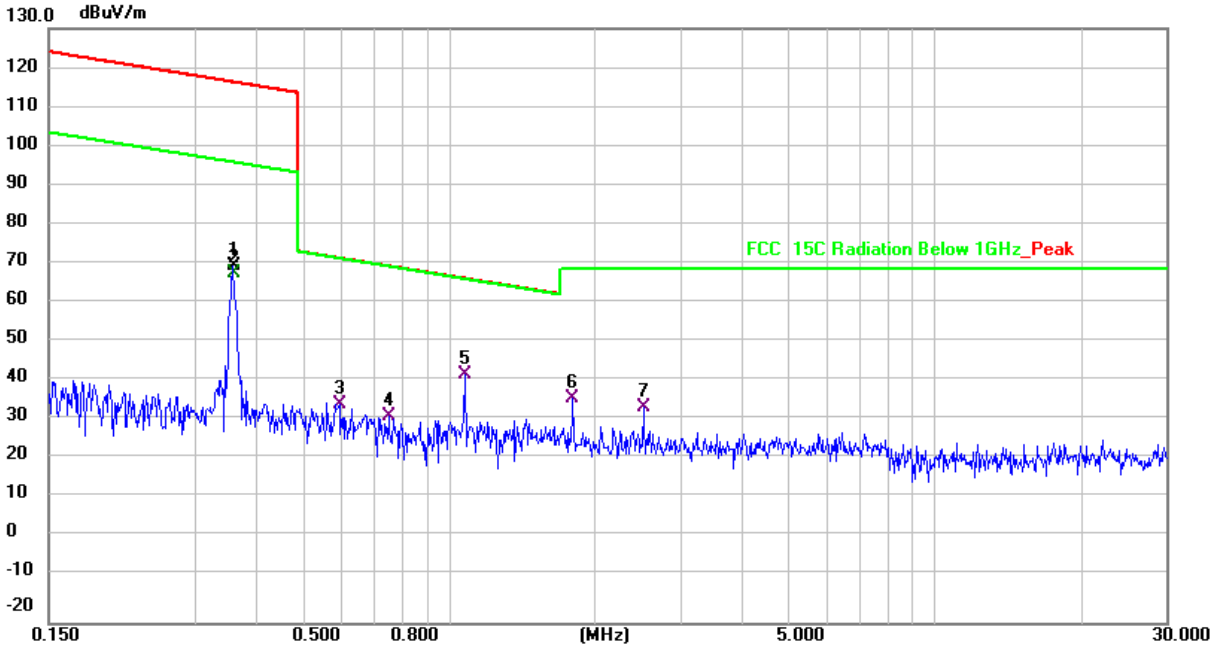
Test mode:	Mode 1	Polarization:	Site axis
Power supply:	Powered by AC/DC adapter (AC 120V/60Hz)	Test site:	RE chamber 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		0.0540	25.12	20.73	45.85	132.92	-87.07	peak
2	*	0.0540	21.57	20.73	42.30	112.92	-70.62	AVG

Frequency 150 kHz ~ 30 MHz

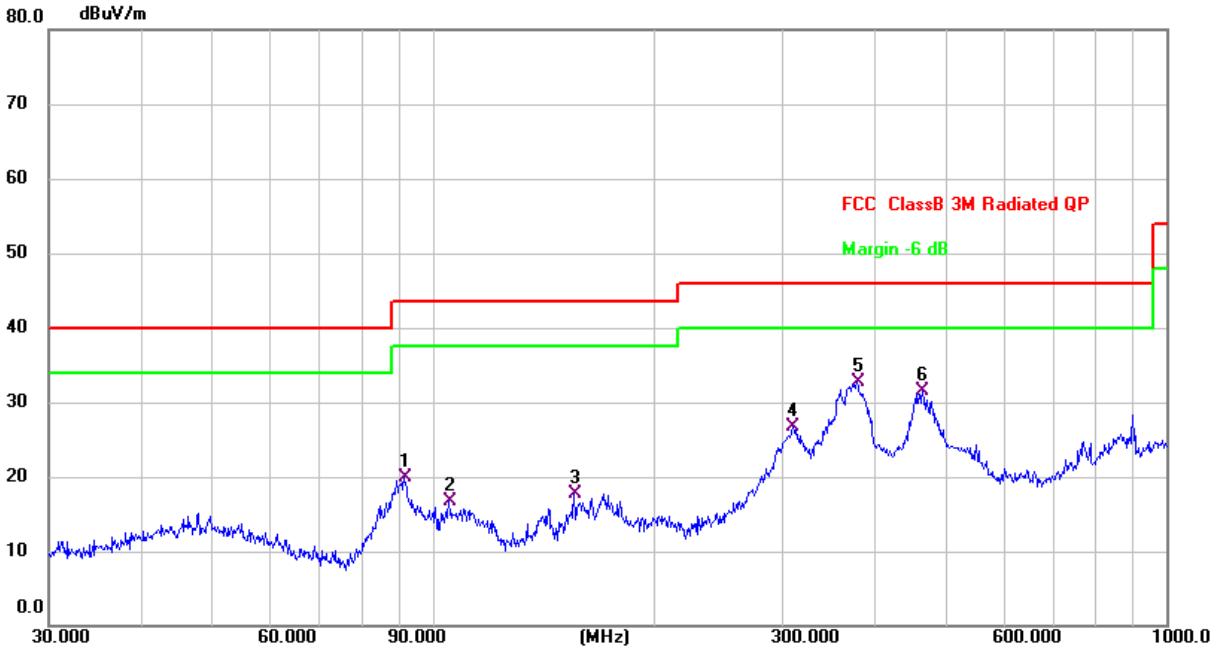
Test mode:	Mode 1	Polarization:	Site axis
Power supply:	Powered by AC/DC adapter (AC 120V/60Hz)	Test site:	RE chamber 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		0.3596	49.80	20.33	70.13	116.49	-46.36	peak
2		0.3596	47.87	20.33	68.20	96.49	-28.29	AVG
3		0.5948	15.01	20.41	35.42	72.12	-36.70	QP
4		0.7508	11.73	20.47	32.20	70.10	-37.90	QP
5	*	1.0766	22.24	20.57	42.81	66.98	-24.17	QP
6		1.8000	16.25	20.63	36.88	69.50	-32.62	QP
7		2.5133	13.81	20.69	34.50	69.50	-35.00	QP

Frequency 30 MHz ~ 1 GHz

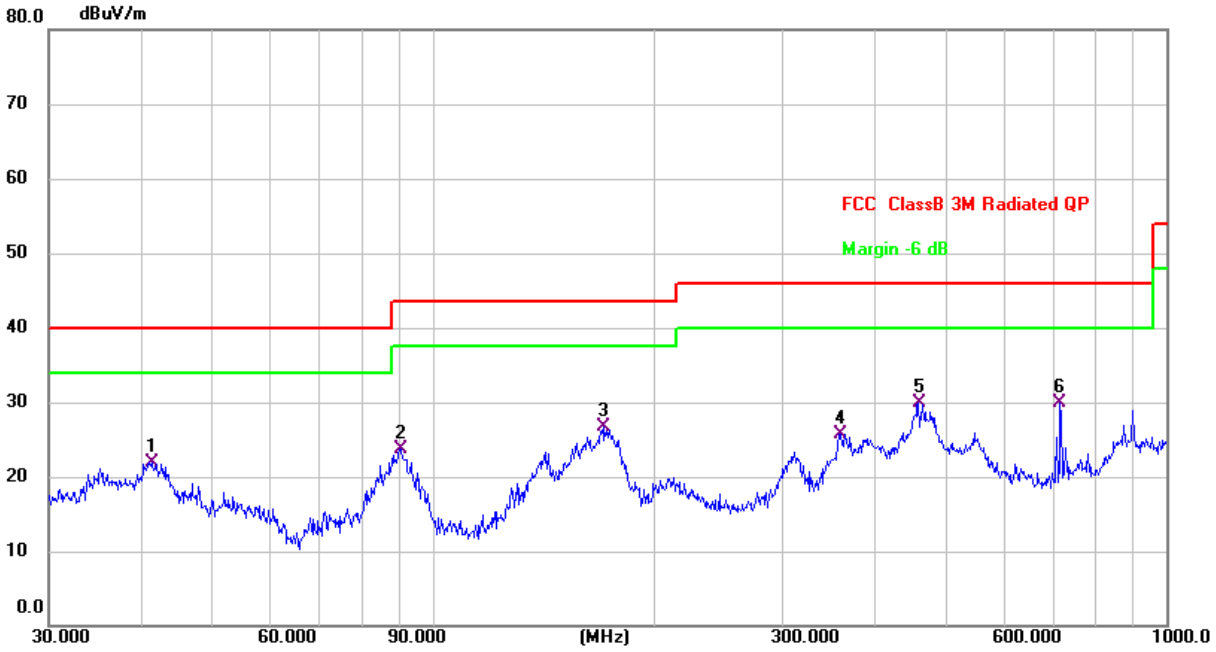
Test mode:	Mode 1	Polarization:	Horizontal
Power supply:	Powered by AC/DC adapter (AC 120V/60Hz)	Test site:	RE chamber 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		91.4949	36.60	-16.71	19.89	43.50	-23.61	QP
2		105.2718	30.14	-13.47	16.67	43.50	-26.83	QP
3		155.9101	33.43	-15.65	17.78	43.50	-25.72	QP
4		309.9977	37.78	-11.09	26.69	46.00	-19.31	QP
5	*	378.5843	42.88	-10.16	32.72	46.00	-13.28	QP
6		465.5994	40.83	-9.24	31.59	46.00	-14.41	QP

Frequency 30 MHz ~ 1 GHz

Test mode:	Mode 1	Polarization:	Vertical
Power supply:	Powered by AC/DC adapter (AC 120V/60Hz)	Test site:	RE chamber 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detecto
1		41.4215	35.47	-13.55	21.92	40.00	-18.08	QP
2		90.5374	40.73	-16.96	23.77	43.50	-19.73	QP
3		170.7926	43.18	-16.51	26.67	43.50	-16.83	QP
4		357.9287	35.82	-10.08	25.74	46.00	-20.26	QP
5		459.1144	39.15	-9.25	29.90	46.00	-16.10	QP
6	*	716.6820	35.51	-5.51	30.00	46.00	-16.00	QP

6.4 Occupied bandwidth test

6.4.1 Test Procedures

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation.

d) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement

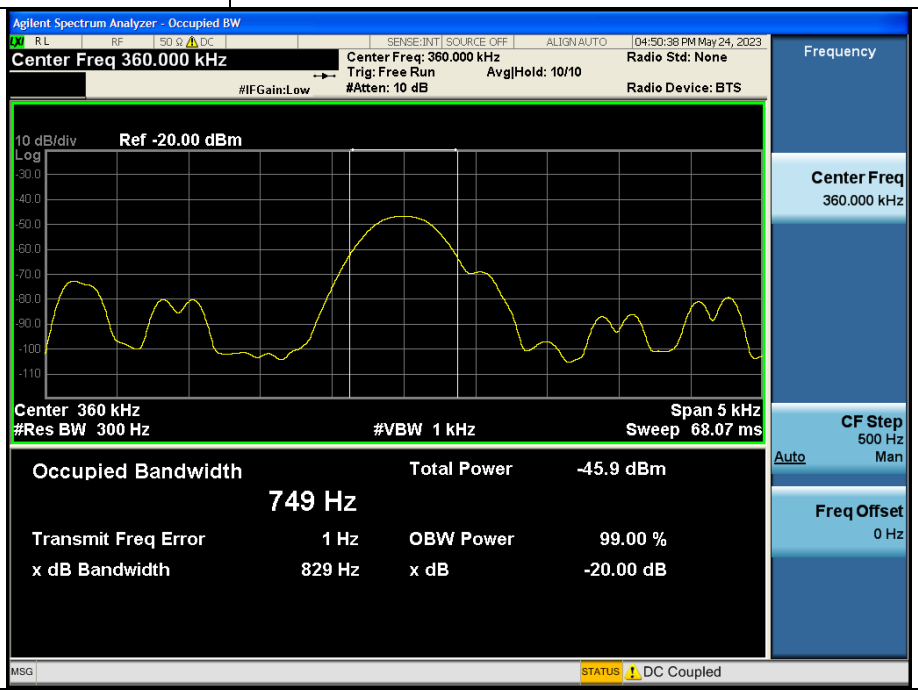
e) Set detection mode to peak and trace mode to max hold.

f) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

6.4.2 Test Result

Note: Because the measured signal is CW-like, adjusting the RBW per C63.10 would not be practical since measurement bandwidth will always follow the RBW. The RBW is set to 300 Hz to perform the occupied bandwidth test.

Frequency kHz	20 dB occupied bandwidth Hz
360	829



Photographs of the test setup

See the Appendix – Test Setup Photos.

Photographs of the EUT

See the Appendix - EUT Photos.

----End of Report----