

TEST REPORT

Application No.: SZEM1903011626CR
Applicant: Spigen Korea Co., Ltd.
Address of Applicant: Spigen HQ-A, 446, Bongeunsa-ro, Gangnam-gu, Seoul, 06153, South Korea.
Manufacturer: Shenzhen Wireless Technology Co., Ltd.
Address of Manufacturer: Floor 2, 3 building A4, Fangxing Science and Technology park, NO.13 Baonan Road, Longgang street, Longgang District
Factory: SHENZHEN POWERQI TECHNOLOGY CO., LTD
Address of Factory: Floor 2, 3 building A4, Fangxing Science and Technology park, NO.13 Baonan Road, Longgang street, Longgang District
Equipment Under Test (EUT):
EUT Name: Fast Wireless Charger
Model No.: F301W
Trade mark: Spigen
FCC ID: 2AFKNF301WR1
Standard(s) : 47 CFR Part 18
Date of Receipt: 2019-03-12
Date of Test: 2019-03-13 to 2019-04-04
Date of Issue: 2019-04-08

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

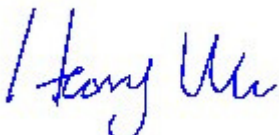
Keny Xu

Keny Xu
EMC Laboratory Manager





Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2019-04-08		Original

Authorized for issue by:			
			
		Harry Wu /Project Engineer	
			
		Eric Fu /Reviewer	



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2 Test Summary

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted disturbance	47 CFR Part 18	FCC MP-5	Part 18.307	Pass
Radiated emission	47 CFR Part 18	FCC MP-5	Part 18.305	Pass



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4 General Information

4.1 Details of E.U.T.

Power supply:	Input: DC 9V, 1.67A, Output: 5W, 7.5W, 10W
Cable:	USB Cable: 150cm, Unshielded
Antenna Type:	Loop Antenna
Modulation Type:	Load Modulation
Operation Frequency:	112kHz to 205kHz
Remark:	This device has been tested the worst status of full load and the device has been tested with load at zero charge, intermediate charge, and full charge.

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Adapter	SAMSUNG	EP-TA200	R37J8YA7W71DK3
iPhone 8	Apple	A1863	F4GVQ656JC6D
Mobile Phone	SAMSUNG	SM-G9500	R28J9140LPB

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 3\%$
4	RF conducted power	$\pm 0.75\text{dB}$
5	RF power density	$\pm 2.84\text{dB}$
6	Conducted Spurious emissions	$\pm 0.75\text{dB}$
7	RF Radiated power	$\pm 4.5\text{dB}$ (below 1GHz)
		$\pm 4.8\text{dB}$ (above 1GHz)
8	Radiated Spurious emission test	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
9	Temperature test	$\pm 1^\circ\text{C}$
10	Humidity test	$\pm 3\%$
11	Supply voltages	$\pm 1.5\%$
12	Time	$\pm 3\%$

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

Conducted disturbance					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	ChangZhou ZhongYu	GB-88	SEM001-06	2017-05-10	2020-05-09
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2018-07-12	2019-07-11
LISN	Rohde & Schwarz	ENV216	SEM007-01	2018-09-25	2019-09-24
LISN	ETS-LINDGREN	3816/2	SEM007-02	2018-04-02	2019-04-01
				2019-04-01	2020-03-31
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2018-04-02	2019-04-01
				2019-04-01	2020-03-31

Radiated emission					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2018-03-31	2021-03-30
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2018-07-12	2019-07-11
EMI Test Receiver (9kHz-7GHz)	Rohde & Schwarz	ESR	SEM004-03	2018-04-02	2019-04-01
				2019-04-01	2020-03-31
Trilog-Broadband Antenna (30MHz-1GHz)	Schwarzbeck	VULB9168	SEM003-18	2016-06-29	2019-06-28
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2018-04-13	2019-04-12
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2018-09-27	2019-09-26
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2018-04-08	2019-04-07



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6 Radio Spectrum Matter Test Results

6.1 Conducted disturbance

Test Requirement Part 18.307
Test Method: FCC MP-5
Limit:

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

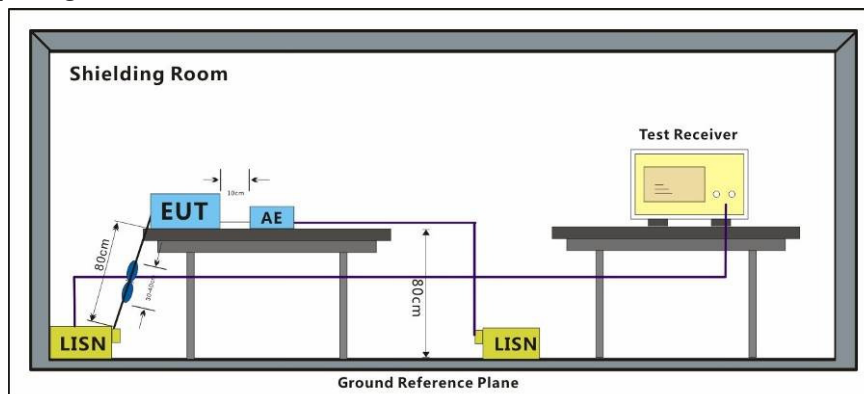
*Decreases with the logarithm of the frequency.

6.1.1 E.U.T. Operation

Operating Environment:

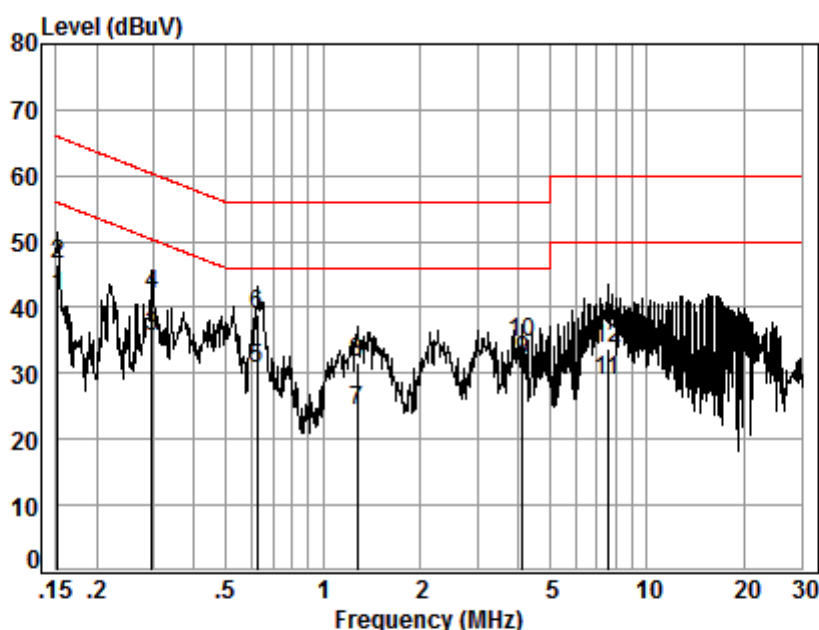
Temperature: 21.9 °C Humidity: 58 % RH Atmospheric Pressure: 1015 mbar
Test mode a:Charge mode_Keep the EUT charging

6.1.2 Test Setup Diagram



6.1.3 Measurement Procedure and Data

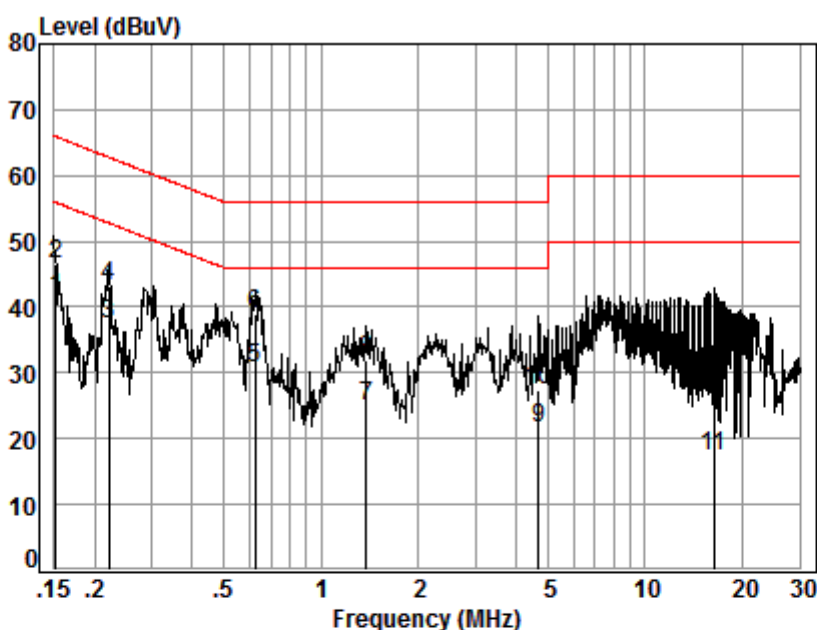
Mode:a; Line:Live Line



Site : Shielding Room
Condition: Line
Job No. : 11626CR
Test mode: a

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15	0.01	9.66	31.89	41.56	55.91	-14.35	Average
2	0.15	0.01	9.66	36.89	46.56	65.91	-19.35	QP
3	0.30	0.04	9.67	26.01	35.72	50.32	-14.60	Average
4	0.30	0.04	9.67	32.13	41.84	60.32	-18.48	QP
5	0.63	0.07	9.67	21.08	30.82	46.00	-15.18	Average
6	0.63	0.07	9.67	29.26	39.00	56.00	-17.00	QP
7	1.28	0.11	9.73	14.39	24.23	46.00	-21.77	Average
8	1.28	0.11	9.73	21.83	31.67	56.00	-24.33	QP
9	4.14	0.16	9.72	22.01	31.89	46.00	-14.11	Average
10	4.14	0.16	9.72	24.75	34.63	56.00	-21.37	QP
11	7.57	0.17	9.80	18.93	28.90	50.00	-21.10	Average
12	7.57	0.17	9.80	23.88	33.85	60.00	-26.15	QP

Mode:a; Line:Neutral Line



Site : Shielding Room
Condition: Neutral
Job No. : 11626CR
Test mode: a

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15	0.01	9.63	31.76	41.40	55.91	-14.51	Average
2	0.15	0.01	9.63	36.88	46.52	65.91	-19.39	QP
3	0.22	0.03	9.64	27.70	37.37	52.79	-15.42	Average
4	0.22	0.03	9.64	33.53	43.20	62.79	-19.59	QP
5	0.63	0.07	9.64	21.02	30.73	46.00	-15.27	Average
6	0.63	0.07	9.64	29.21	38.92	56.00	-17.08	QP
7	1.38	0.12	9.70	15.02	24.84	46.00	-21.16	Average
8	1.38	0.12	9.70	21.97	31.79	56.00	-24.21	QP
9	4.70	0.17	9.70	11.71	21.58	46.00	-24.42	Average
10	4.70	0.17	9.70	17.62	27.49	56.00	-28.51	QP
11	16.31	0.22	10.30	6.80	17.32	50.00	-32.68	Average
12	16.31	0.22	10.30	18.20	28.72	60.00	-31.28	QP



6.2 Radiated emission

Test Requirement Part 18.305
Test Method: FCC MP-5
Measurement Distance: 3m
Limit:

Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit (uV/m)	Distance (meters)
Any type unless otherwise specified (miscellaneous)	Any non-ISM frequency	Below 500 500 or more	15 $15 \times \text{SQRT}(\text{power}/500)$	300 1300

¹Field strength may not exceed 10 $\mu\text{V/m}$ 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.

Frequency band in which device operates (MHz)	Range of frequency measurements	
	Lowest frequency	Highest frequency
Below 1.705	Lowest frequency generated in the device, but not lower than 9 kHz	30 MHz.
1.705 to 30	Lowest frequency generated in the device, but not lower than 9 kHz	400 MHz.
30 to 500	Lowest frequency generated in the device or 25 MHz, whichever is lower	Tenth harmonic or 1,000 MHz, whichever is higher.
500 to 1,000	Lowest frequency generated in the device or 100 MHz, whichever is lower	Tenth harmonic.
Above 1,000	do	Tenth harmonic or highest detectable emission.



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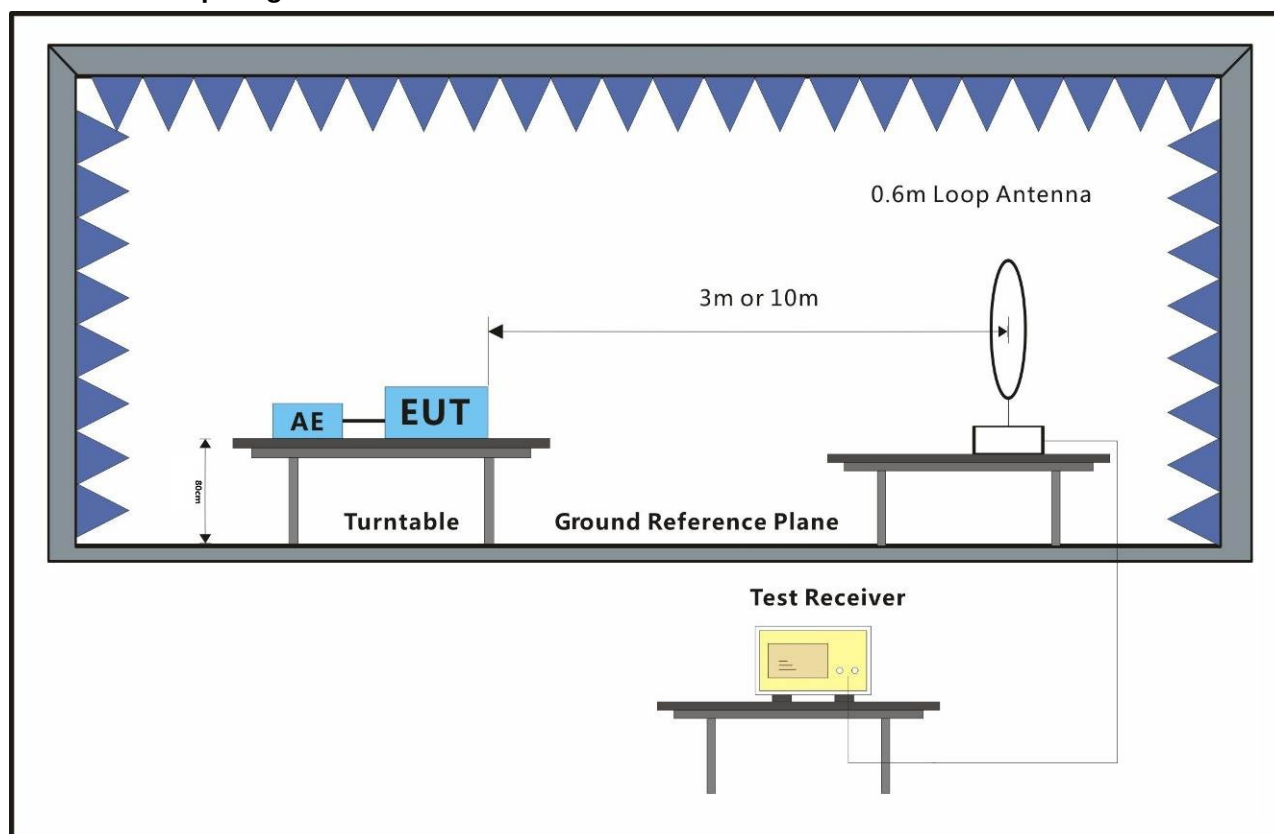
6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

Test mode a: Charge mode_Keep the EUT charging

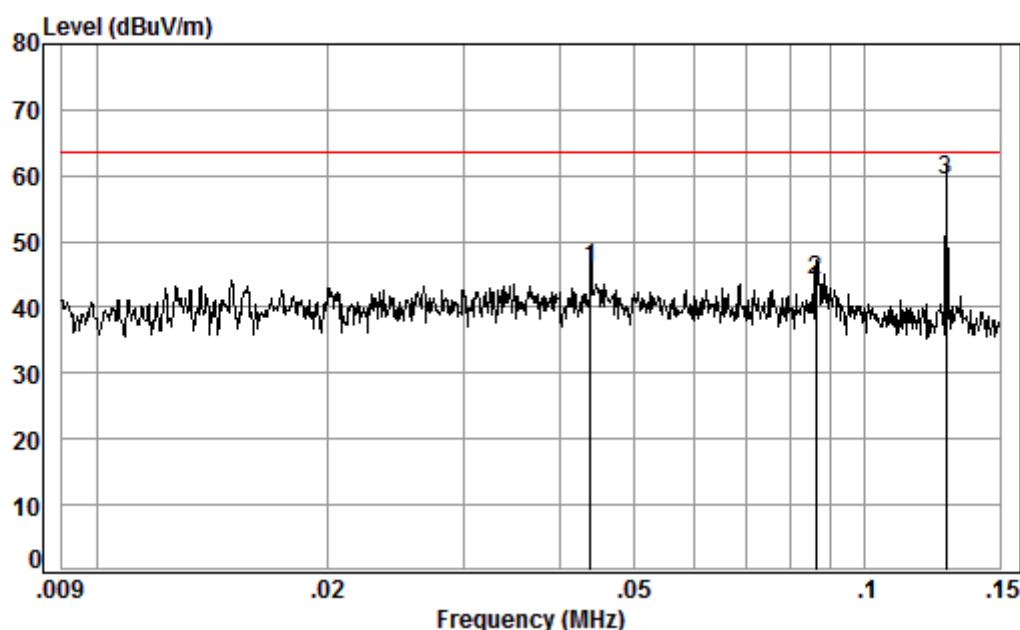
6.2.2 Test Setup Diagram



6.2.3 Measurement Procedure and Data

- Test Procedure:
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber(30MHz-1000MHz) and 3 meter semi-anechoic chamber(9kHz-30MHz). The table was rotated 360 degrees to determine the position of the highest radiation.
 - The EUT was set 10 meters(30MHz-1000MHz) and 10 meter (9kHz-30MHz) away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
 - Above 30MHz: The Analyzer/Receiver scanned from 30MHz to 1000MHz. The antenna height 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.
 - Below 30MHz: The Analyzer/Receiver scanned from 9kHz to 30MHz. The antenna height is 2 meters above the ground to determine the maximum value of the field strength.
 - 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 2 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
 - The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
 - If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
 - Repeat above procedures until all frequencies measured was complete.
 - Measurement Requirement:
 - 1) This product belongs to non-ISM equipment, the field strength limit is 15uV/m at 300 meter distance.
 - 2) Limit: $20\log(15\text{uV/m}) + 20\log(300/3) = 23.52 + 40 = 63.52\text{dBuV/m}$ at 3 meters distance

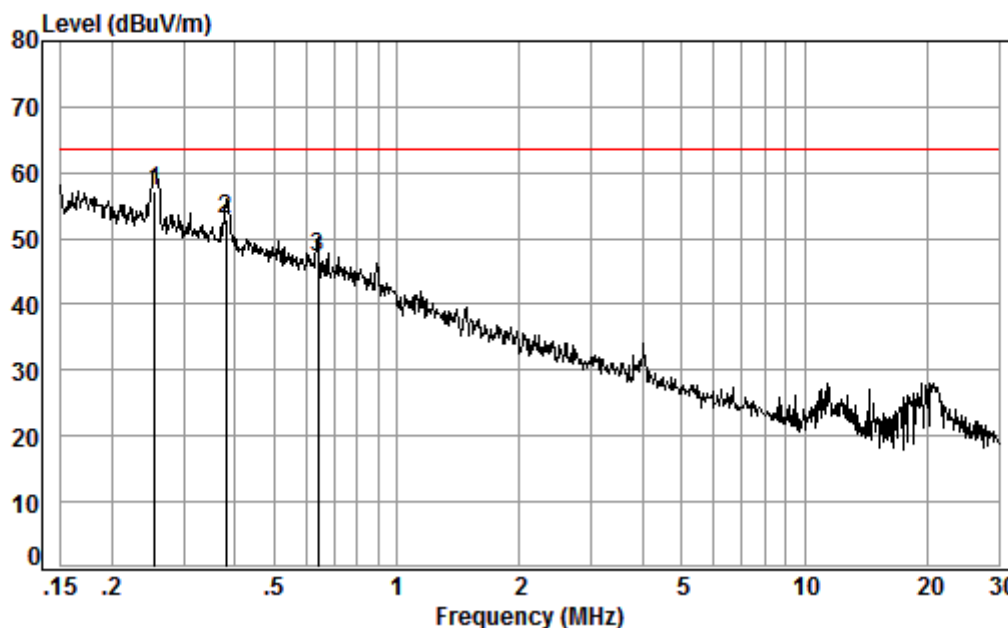
9kHz-150kHz



Condition: 3m
Job No. : 11626CR
Test Mode: a

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	0.04	0.14	12.77	32.22	65.39	46.08	63.52	-17.44	Average
2	0.09	0.07	12.05	32.60	64.66	44.18	63.52	-19.34	Average
3 pp	0.13	0.06	11.82	32.67	79.99	59.20	63.52	-4.32	Average

150kHz-30MHz



Condition: 3m

Job No. : 11626CR

Test Mode: a

		Cable	Ant	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	pp	0.25	0.08	11.99	32.66	77.89	57.30	63.52	-6.22 Average
2		0.38	0.10	11.82	32.66	73.57	52.83	63.52	-10.69 Average
3		0.64	0.15	11.88	32.65	67.70	47.08	63.52	-16.44 Average



7 Photographs

7.1 Test Setup

Please refer to setup photos.

7.2 EUT Constructional Details (EUT Photos)

Please refer to external and internal photos for details.

- End of the Report -



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