

Prüfbericht-Nr.: Test Report No.:	50083918 001	Auftrags-Nr.: Order No.:	1140035262	Seite 1 von 32 Page 1 of 32
Kunden-Referenz-Nr.: Client Reference No.:	N/A	Auftragsdatum: Order date:	2017-04-21	
Auftraggeber: Client:	XIANGJIN (TIANJIN) CYCLE CO., LTD. No.20, Xixia Road, Zhongbei Industrial Zone, Xiqing District Tianjin 300112 P.R. China			
Prüfgegenstand: Test item:	Electric Bicycle			
Bezeichnung / Typ-Nr.: Identification / Type No.:	E-Times City 4000DV-26 E-Times City 4000DV			
Auftrags-Inhalt: Order content:	CE EMC			
Prüfgrundlage: Test specification:	EN 15194:2009+A1, Clause 4.2.5.1, 4.2.5.2			
Wareneingangsdatum: Date of receipt:	2017-05-15			
Prüfmuster-Nr.: Test sample No.:	Engineering sample			
Prüfzeitraum: Testing period:	2017-05-15 ~ 2017-06-04			
Ort der Prüfung: Place of testing:	Refer to section 1.1			
Prüflaboratorium: Testing laboratory:	Refer to section 1.1			
Prüfergebnis*: Test result*:	Pass			
geprüft von / tested by:		geprüft von / tested by:		
2017-06-15 Zhu, Qiusheng /PE 		2017-06-15 Sun, Lixun /TC 		
Datum Date	Name / Stellung Name / Position	Unterschrift Signature	Datum Date	Name / Stellung Name / Position
Sonstiges / Other: Manufacturer or/and his importer shall ensure product bears label requirements in article 7 and article 9 of the 2014/30/EU relate to name, batch number, post address prior place the product into EU market.				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

TEST SUMMARY

4.1.1 RADIATED EMISSION

Result:

Pass

5.1.1 ELECTROSTATIC DISCHARGE

Result:

Pass

5.1.2 RADIO FREQUENCY ELECTROMAGNETIC FIELD

Result:

Pass

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1 Test Sites

1.1 Test Facilities

1. Laboratory: GRG METROLOGY&TEST BEIJING CO., LTD
Address: 1-2Floor,Building 5,No.8,Liangshuihe No.2 Street, Beijing Development Area, Beijing

The used test equipment is in accordance with CISPR 16-1 series standards for measurement of radio interference.

1.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Lab 1: (Radiated Electromagnetic Field Emission, Electrostatic Discharge and Radio Frequency Electromagnetic Field)

No.	Equipment	Manufacturer	Model	Serial no.	Cal. due date
1	Signal Generator	R&S	SMC100A	105555	2018-05-29
2	Signal Generator	R&S	SMB100A	179605	2018-05-29
3	Antenna	AR	ATP 10K100M	0345849	2018-05-29
4	Bi-conical antenna	Schwarzbeck	STLP9128E	3009	2018-05-29
5	Horn antenna	Schwarzbeck	BBHA 9120 J	00017	2018-05-29
6	Power Amplifier	Rflight	NTWPA-000001013500E	16069027	2018-05-29
7	Power Amplifier	Rflight	NTWPA-008102000700E	16049016	2018-05-29
8	Power Amplifier	Rflight	NTWPA-1025250	16043073	2018-05-29
9	Power meter	R&S	NRP2	105017	2018-05-29
10	Power meter	R&S	NRP2	105018	2018-05-29
11	Power probe	R&S	Z-91	103366	2018-05-29
12	Power probe	R&S	Z-91	103367	2018-05-29
13	Power probe	R&S	Z-85	101594	2018-05-29
14	Power probe	R&S	Z-85	101595	2018-05-29
15	Field monitor	AR	FM7004A	0345179	2018-06-01
16	Field probe	AR	FL7040	0344781	2018-06-01
17	EMI receiver	R & S	ESU 40	100493	2018-02-09
18	Bi-conical antenna	Schwarzbeck	VHBB 9124/BBA9106	00859/126	2018-05-29
19	Log-periodic antenna	Schwarzbeck	VUSLP 9111B	201	2018-05-29
20	ESD Simulator	TESEQ	NSG 437	1009	2017-06-18

2 General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is an electric bicycle. For the further information, refer to the user's manual.

2.2 Ratings and System Details

Product name	: Electric Bicycle
Type	: E-Times City 4000DV-26 E-Times City 4000DV
System input voltage	: DC36V
Max. Speed	: 25 km/h
Max. continuous rated power	: 250W
Protection class	: III

They have the same electrical components, same construction and arrangement of signal line, only difference is that they have the different size of frame and fork, and length of display panel line.

The size of frame and fork and length of display panel line of E-Times City 4000DV are longer than that of E-Times City 4000DV-26, based on the above mentioned, the model E-Times City 4000DV is the most complex model, therefore all the EMC test items were performed on the model E-Times City 4000DV. The EMC test was not performed on the battery charger according to the client's requirements.

2.3 Independent Operation Modes

Emission according to C.2.2.2 and C.3.1.4, Immunity according to C.4.4. of EN15194:2009+A1.

2.4 Noise Generating and Noise Suppressing Parts

Refer to the circuit diagram for further information.

2.5 Submitted Documents

Construction diagram, BOM, User's manual, Nameplate

3 Test Set-up and Operation Modes

3.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible emission level. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

Immunity: The equipment under test (EUT) was configured to have its highest possible susceptibility against the tested phenomena. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

3.2 Physical Configuration for Testing

Refer to the related paragraph of this report.

3.3 Test Operation and Test Software

Refer to the related paragraph of this report.
No software was used.

3.4 Special Accessories and Auxiliary Equipment

None.

3.5 Countermeasures to achieve EMC Compliance

For ESD test:

- a. Add four diodes (telecommunication port: two diodes, DC5V: one diode, Pin of RESET of IC: one diode)
- b. Add one 47uF/50V capacitor between the DC power positive and negative polarity.
- c. Add one 104pF capacitor between the DC power positive and negative polarity.

For radiated emission:

- a. Add one EMI ferrite core on the motor cable, which model is ZCAT1720-0730 manufactured by TDK.

4 Test Results Emission

4.1 Emission in the Frequency Range above 30 MHz

4.1.1 Radiated emission

Result:	Pass
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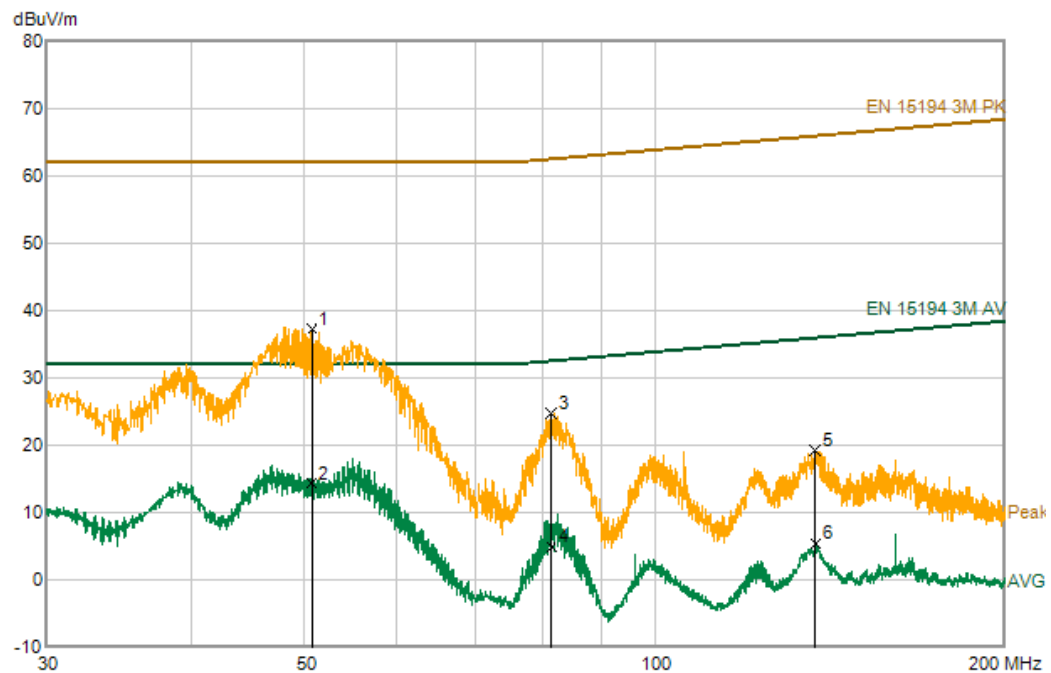
Date of testing	: 2017-06-04
Test procedure	: EN 15194:2009+A1
Frequency range	: 30 – 1000MHz
Limits	: Peak limits (3m test distance): 30MHz-75MHz: 62dB(uV/m) 75MHz-400MHz: 62 – 73 dB(uV/m), Increasing linearly with the logarithm of the frequency 400MHz-1000MHz: 73dB(uV/m) Average limits (3m test distance): 30MHz-75MHz: 32dB(uV/m) 75MHz-400MHz: 32 – 43 dB(uV/m), Increasing linearly with the logarithm of the frequency 400MHz-1000MHz: 43dB(uV/m)
Kind of test site	: Semi-anechoic chamber
Operation mode	: According to C.2.2.2 and C.3.1.4

The radiated disturbance test was carried out in a semi-anechoic chamber. The test distance from the receiving antenna to the EUT is 3m. The normalized site attenuation of the semi-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. The height of the antenna is 1.8m±0.05m for vertical and horizontal polarity. When the test antenna is horizontal polarity, the engine midpoint should be positioned on normal from antenna midpoint. The test was performed with the antenna both in its horizontal and vertical polarizations.

The EUT is achieved by braking to apply a load in order to test at 75% ± 10% of the continuous rated power.

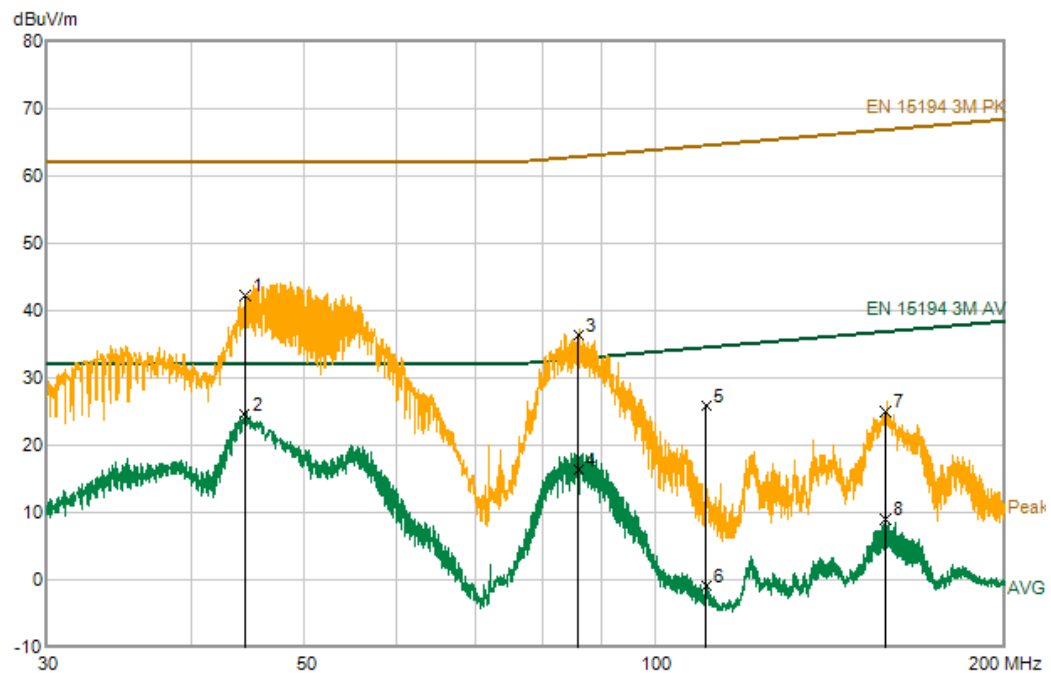
The following figures were those measured and recorded by a test receiver. The curves in the figure were those measured with a peak detector for broad-band radiation and average detector for narrow-band radiation for the max. measurement result.

Figure 1: Spectral diagram and measurement results of broad-band radiated disturbance and narrow-band radiated disturbance, horizontal, 30MHz-200MHz



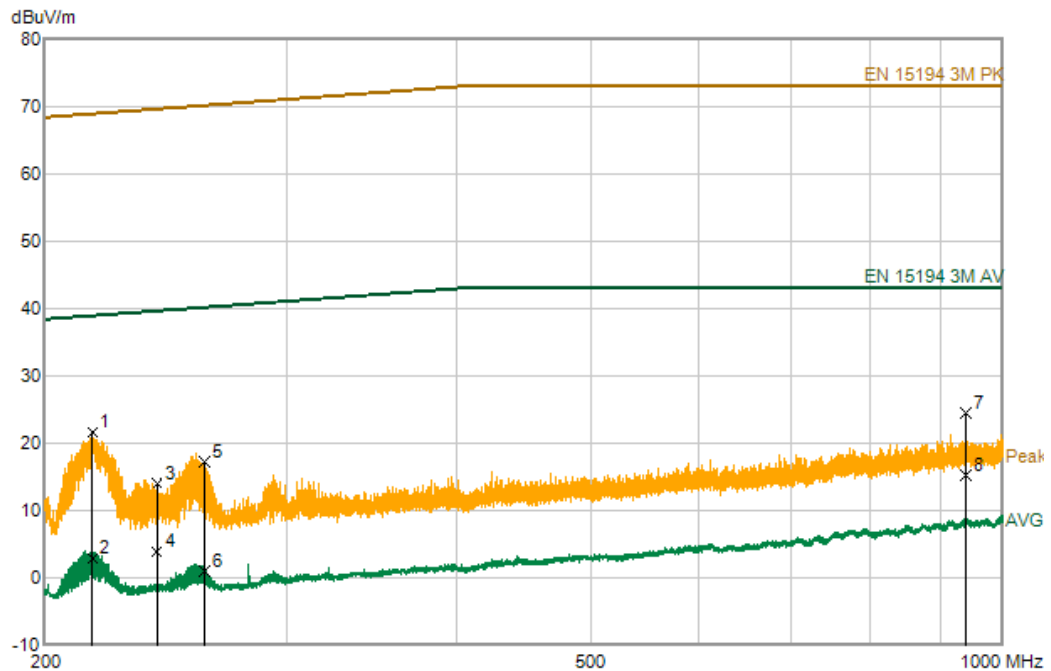
Final measurement results:

No.	Frequenc y (MHz)	Level (dBuV)	Factor (dB)	Result (dBuV/ m)	Limit (dBuV/ m)	Margin (dB)	Remark
1	50.7	68.85	-31.54	37.31	62	24.69	Peak
2	50.7	45.86	-31.54	14.32	32	17.68	AV
3	81.5	56.7	-31.95	24.75	62.55	37.8	Peak
4	81.5	36.91	-31.95	4.96	32.55	27.59	AV
5	137.4	48.73	-29.48	19.25	65.98	46.73	Peak
6	137.4	34.87	-29.48	5.39	35.98	30.59	AV

Figure 2: Spectral diagram and measurement results of broad-band radiated disturbance and narrow-band radiated disturbance, Vertical, 30-200MHz


Final measurement results:

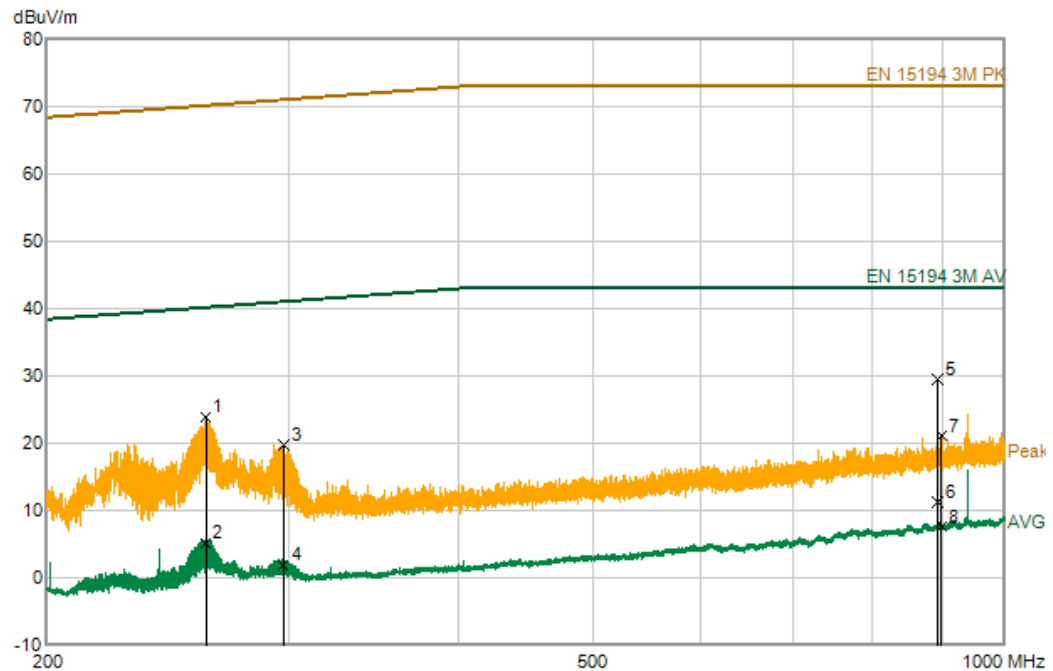
No.	Frequenc y (MHz)	Level (dBuV)	Factor (dB)	Result (dBuV/ m)	Limit (dBuV/ m)	Margin (dB)	Remark
1	44.4	73.21	-30.94	42.27	62	19.73	Peak
2	44.4	55.56	-30.94	24.62	32	7.38	AV
3	86	68.18	-31.83	36.35	62.9	26.55	Peak
4	86	48.15	-31.83	16.32	32.9	16.58	AV
5	110.7	56.81	-30.93	25.88	64.56	38.68	Peak
6	110.7	30.01	-30.93	-0.92	34.56	35.48	AV
7	157.85	53.53	-28.48	25.05	66.89	41.84	Peak
8	157.85	37.42	-28.48	8.94	36.89	27.95	AV

Figure 3: Spectral diagram and measurement results of broad-band radiated disturbance and narrow-band radiated disturbance, horizontal, 200MHz-1000MHz


Final measurement results:

No.	Frequency (MHz)	Level (dBuV)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	216.65	50.14	-28.47	21.67	68.97	47.3	Peak
2	216.65	31.38	-28.47	2.91	38.97	36.06	AV
3	241.5	42.13	-28.05	14.08	69.68	55.6	Peak
4	241.5	31.98	-28.05	3.93	39.68	35.75	AV
5	261.4	44.3	-27.05	17.25	70.2	52.95	Peak
6	261.4	28.02	-27.05	0.97	40.2	39.23	AV
7	939.55	39.74	-15.27	24.47	73	48.53	Peak
8	939.55	30.46	-15.27	15.19	43	27.81	AV

Figure 4: Spectral diagram and measurement results of broad-band radiated disturbance and narrow-band radiated disturbance, vertical, 200MHz-1000MHz



Final measurement results:

No.	Frequenc y (MHz)	Level (dBuV)	Factor (dB)	Result (dBuV/ m)	Limit (dBuV/ m)	Margin (dB)	Remark
1	261.3	50.96	-27.06	23.9	70.2	46.3	Peak
2	261.3	32.23	-27.06	5.17	40.2	35.03	AV
3	297.75	45.48	-25.79	19.69	71.06	51.37	Peak
4	297.75	27.69	-25.79	1.9	41.06	39.16	AV
5	893.15	45.21	-15.79	29.42	73	43.58	Peak
6	893.15	27.15	-15.79	11.36	43	31.64	AV
7	899.4	36.75	-15.72	21.03	73	51.97	Peak
8	899.4	23.26	-15.72	7.54	43	35.46	AV

5 Test Results Immunity

During the immunity tests, the EUT was operated under conditions specified by clause 3.1 of this report.

A vehicle is deemed to fulfil the electromagnetic radiation immunity conditions if:
There are no abnormal changes in the speed of the vehicle's drive wheels, there are no signs of operational deterioration which might mislead other road users and there are no other noticeable phenomena which could result in a deterioration in the direct control of the vehicle.

For electrostatic discharger:

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Date of testing: 2017-05-15 ~ 2017-05-23

Room temperature	:	25°C
Relative humidity	:	42%

5.1 Enclosure

5.1.1 Electrostatic Discharge

Result:	Pass
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The immunity against electrostatic discharge was tested in accordance with EN 15194:2009. Test setup and ESD-Generator are according to EN 61000-4-2:2001.

The EUT is placed on 0,1m wood table above the ground plane. And the minimum distance between the EUT and all other conductive structures except the ground plane beneath the EUT is more than 0,5m.

The reference ground plane is an aluminum sheet of 0,25mm minimum thickness. The reference ground plane is connected to the protective earth. The size of the ground plane is 2m x 2m.

A Vertical coupling plane of dimensions 0,5m x 0,5m is placed parallel to and positioned at a distance of 0,1m from the EUT.

Charge voltage	:	±4.0kV (Contact Discharge) ±2.0kV, ±4.0kV, ±8.0kV (Air Discharge)
Polarity	:	positive / negative
Number of discharges	:	≥10
Performance criteria	:	B

Table 2: ESD, Positive / Negative Polarity

Position	Kind of Discharge	Result	Remarks
Non-metallic enclosure, Seam, Switch, LCD	Air discharge ±2.0kV, ±4.0kV, ±8.0kV	Passed	No disturbance of function
Metallic enclosure	Contact discharge ±4kV	Passed	No disturbance of function
Coupling plane (VCP)	Contact discharge ±4kV	Passed	No disturbance of function

5.1.2 Radio Frequency Electromagnetic Field

Result:	Pass
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The test was performed inside a semi-anechoic chamber with a test distance of 3m. The phase of mid-point of antenna is at a height of 1.5m above the vehicle plane. No part of the antenna radiator elements was less than 0,25 m from the vehicle plane. The reference point was defined according to C.4.5.3 and electromagnetic field strength at reference point and either side were calibrated according to C.4.5.3 and C.4.7. The substitution method was used for the purpose of creating the field test conditions. Only vertical polarization mode was selected according to C.4.6.1 b).

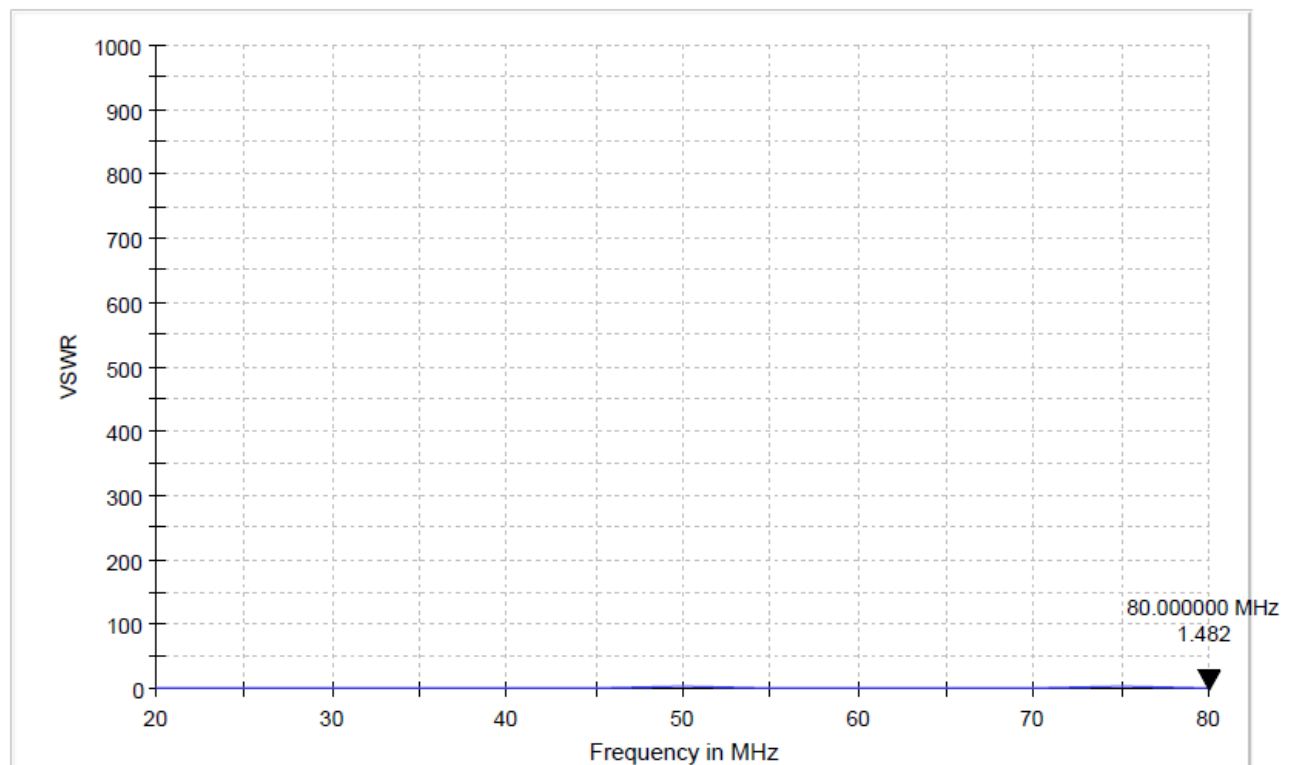
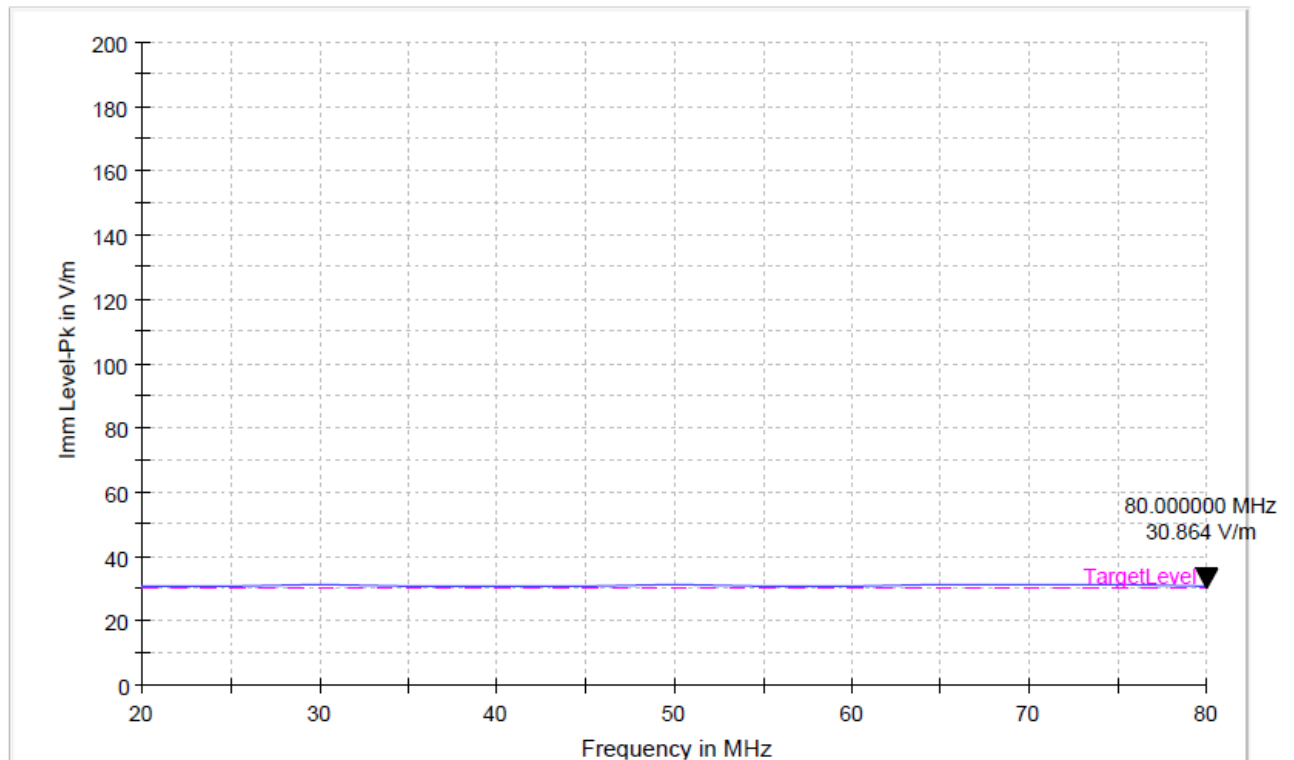
Date of testing	:	2017-05-15
Basic standard	:	EN 15194:2009+A1 and ISO11451-1:2005+A1
Test level	:	30V/m
Modulation	:	80% AM, 1kHz
Frequency scan speed	:	Frequency step: 20MHz~200MHz: 5MHz 200MHz~400MHz: 10MHz 400MHz~1000MHz: 20MHz 1000MHz~2000MHz: 40MHz Dwell time: 2s
Performance criteria	:	Refer to the first page of clause 5 of this report
Ambient conditions	:	Temperature: 25°C; Relative humidity: 42%

Table 3: Radiated electromagnetic field test results

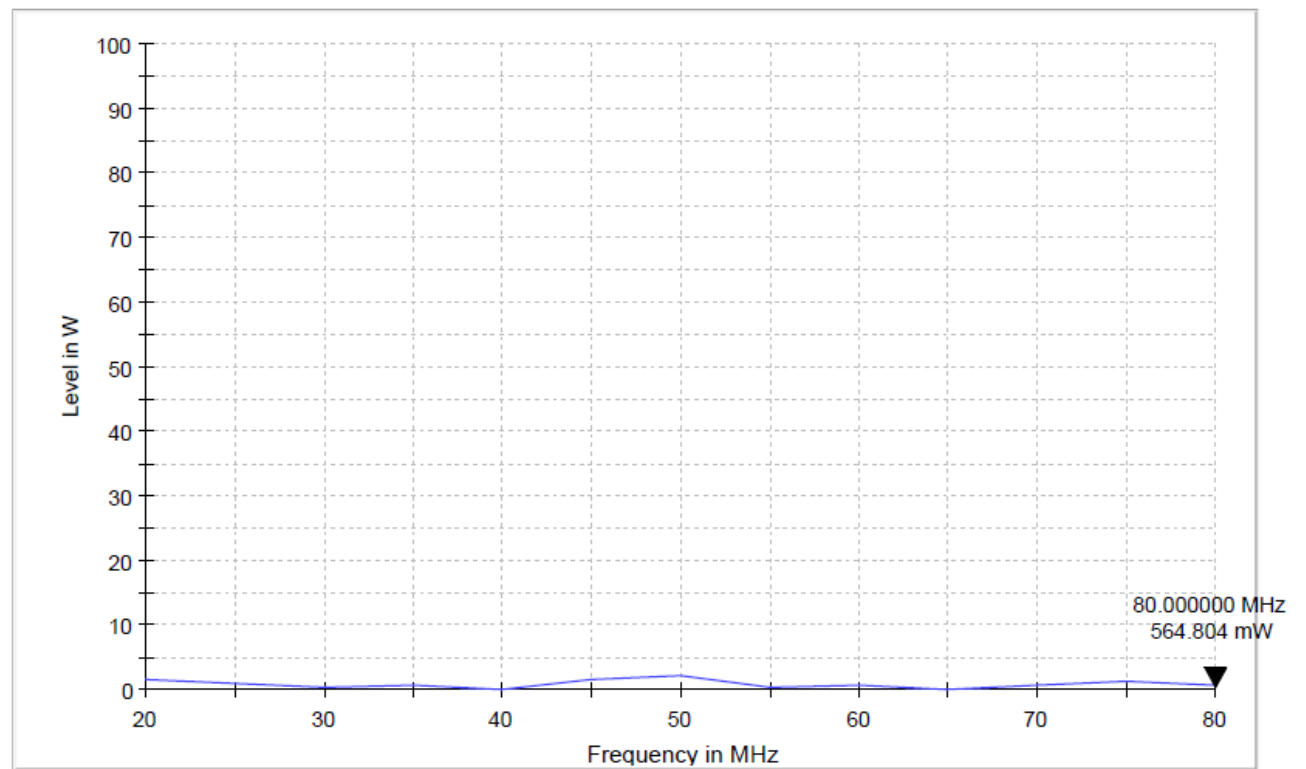
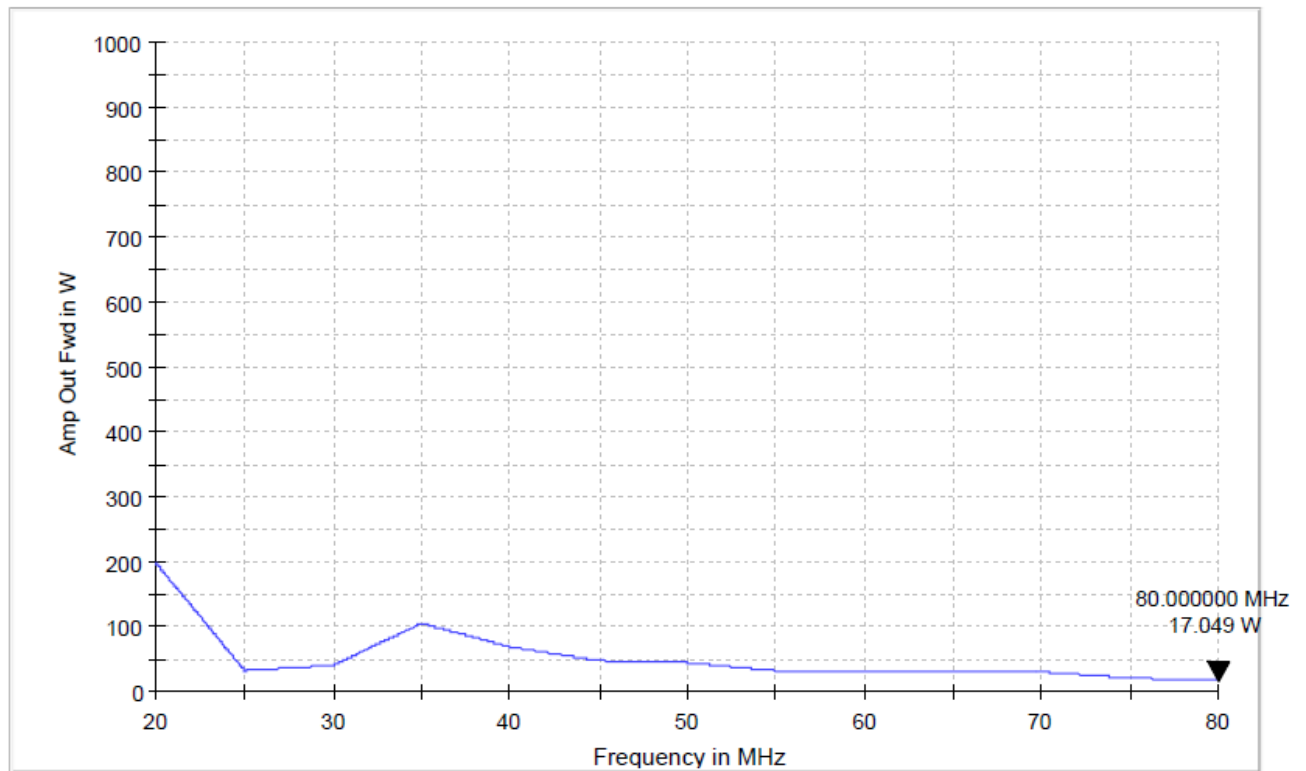
Field polarization	Result	Observation
Vertical polarization	Passed	No disturbance of function

The following are the test curves such as immunity level, antenna in forward power, VSWR, amplifier output forward power, amplifier output reversion power, amplifier in for each mode for the whole frequency range.

Figure 5: Radio frequency electromagnetic field for standstill mode for 20MHz-80MHz



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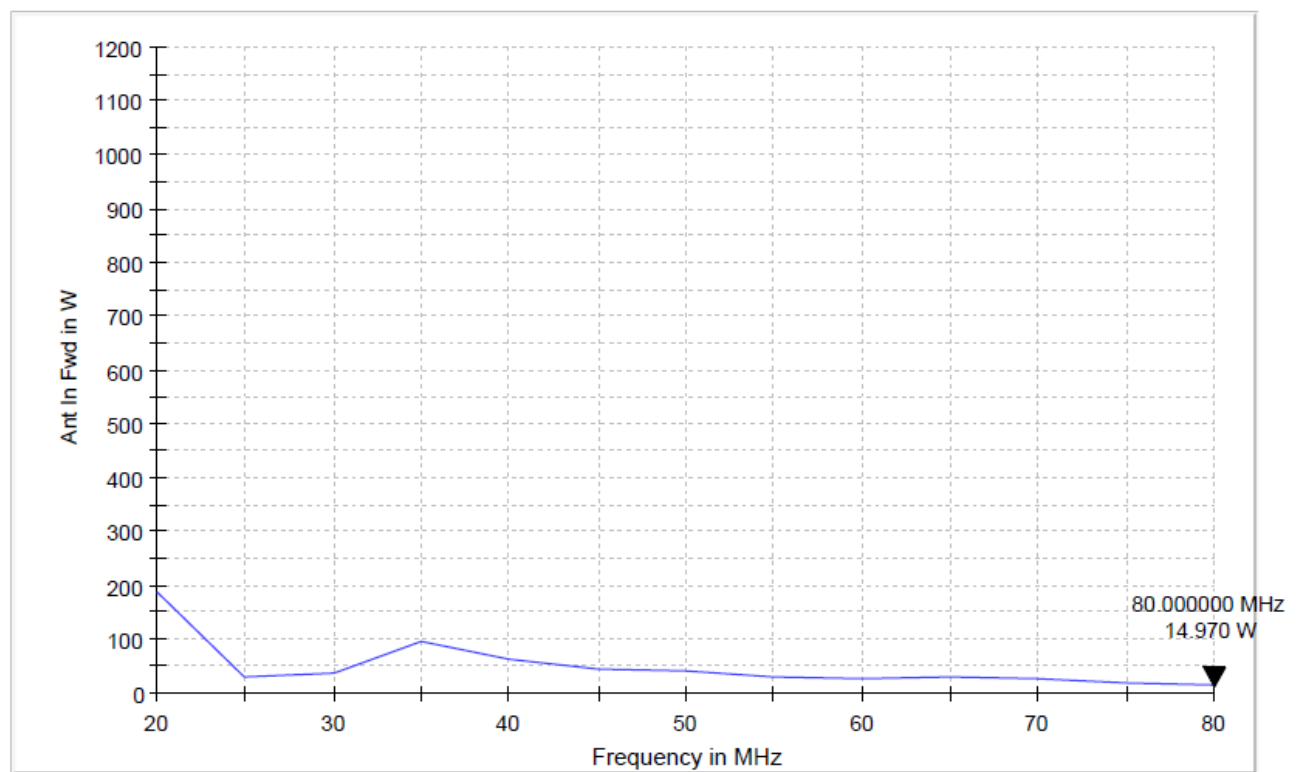
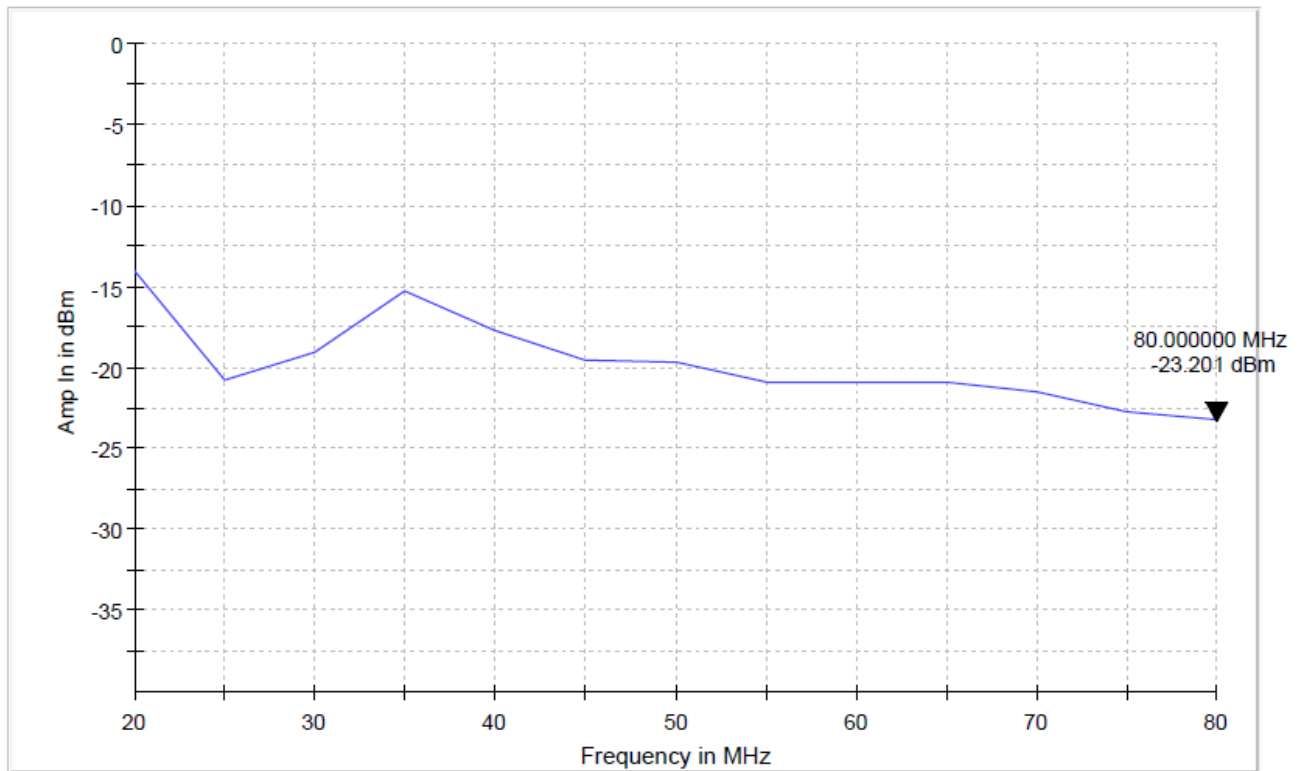
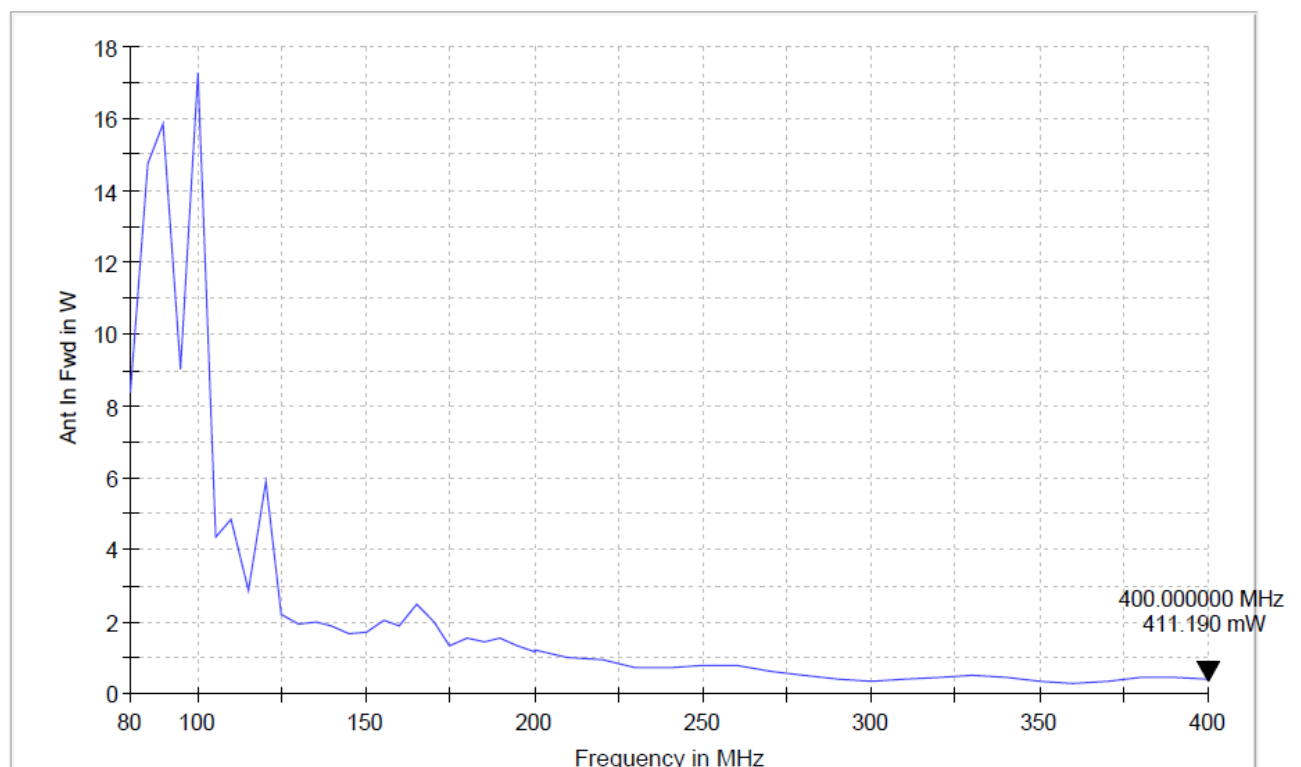
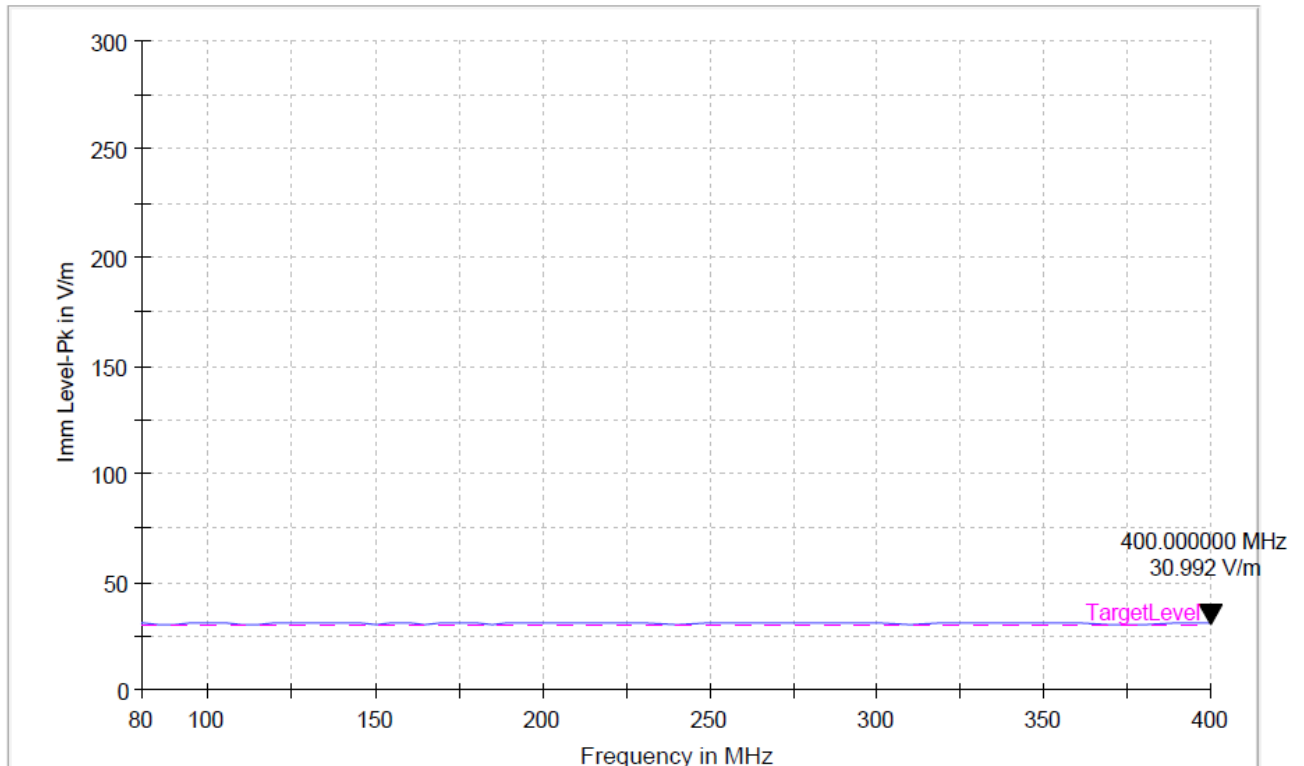
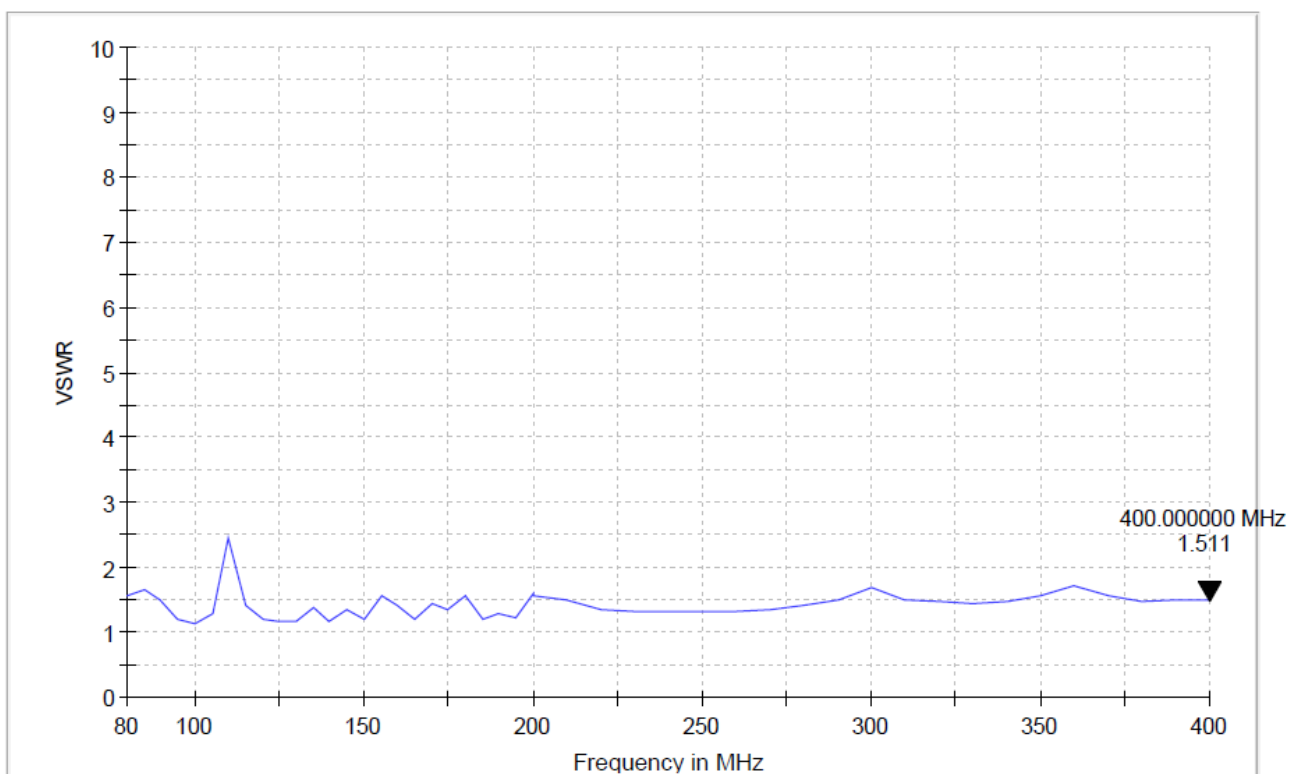
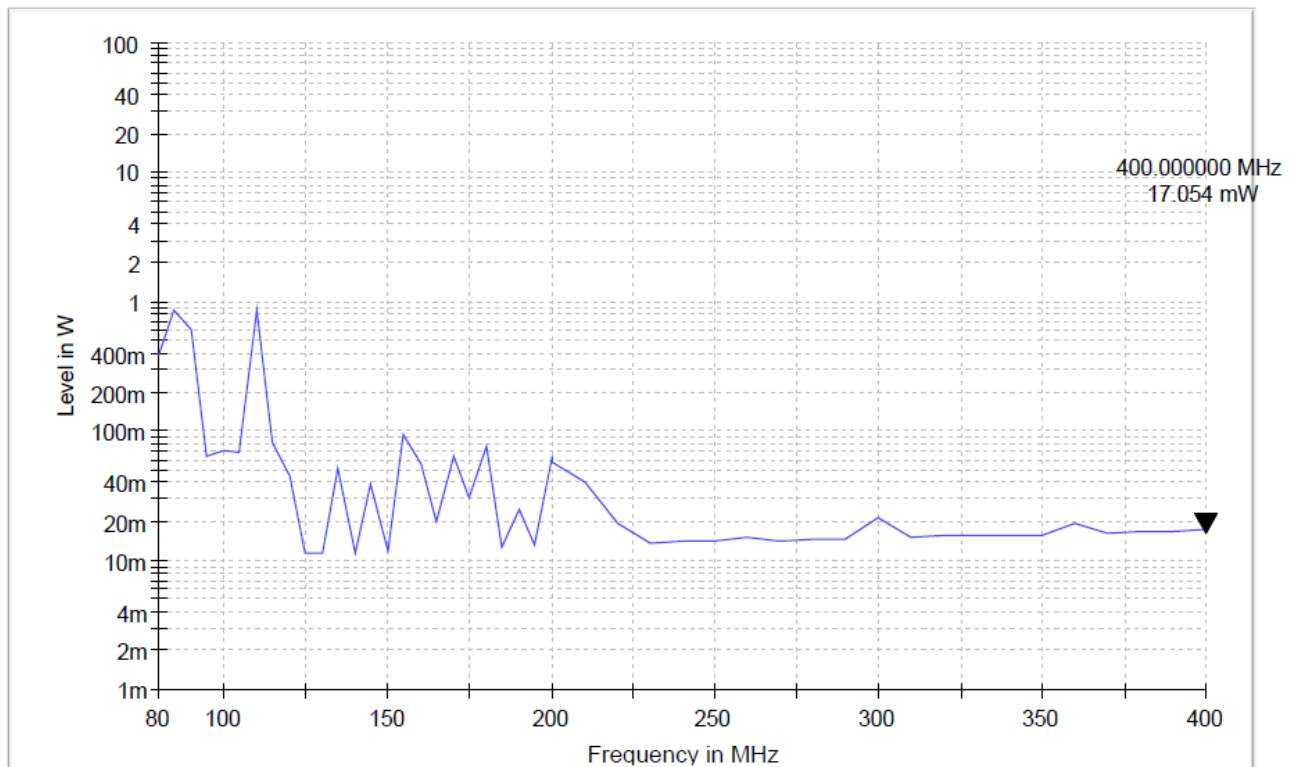
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Figure 6: Radio frequency electromagnetic field for standstill mode for 80MHz-400MHz



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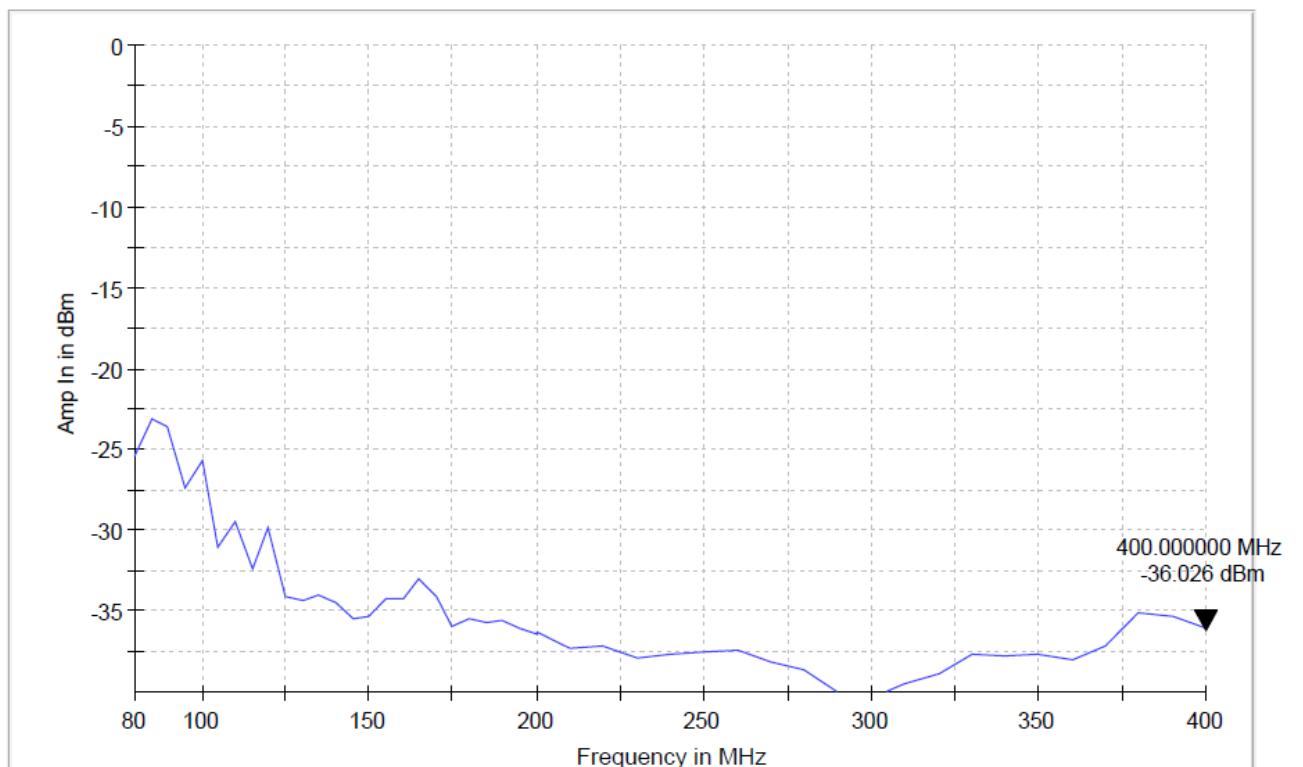
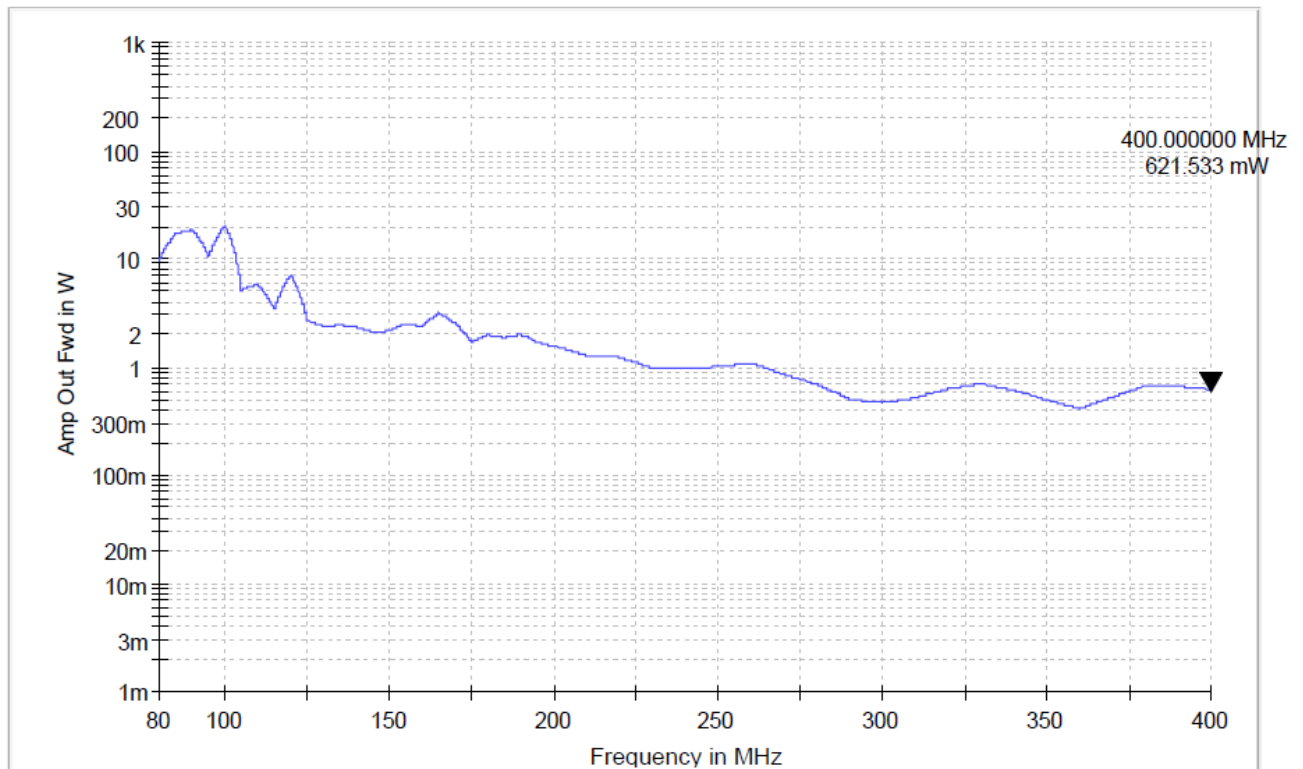
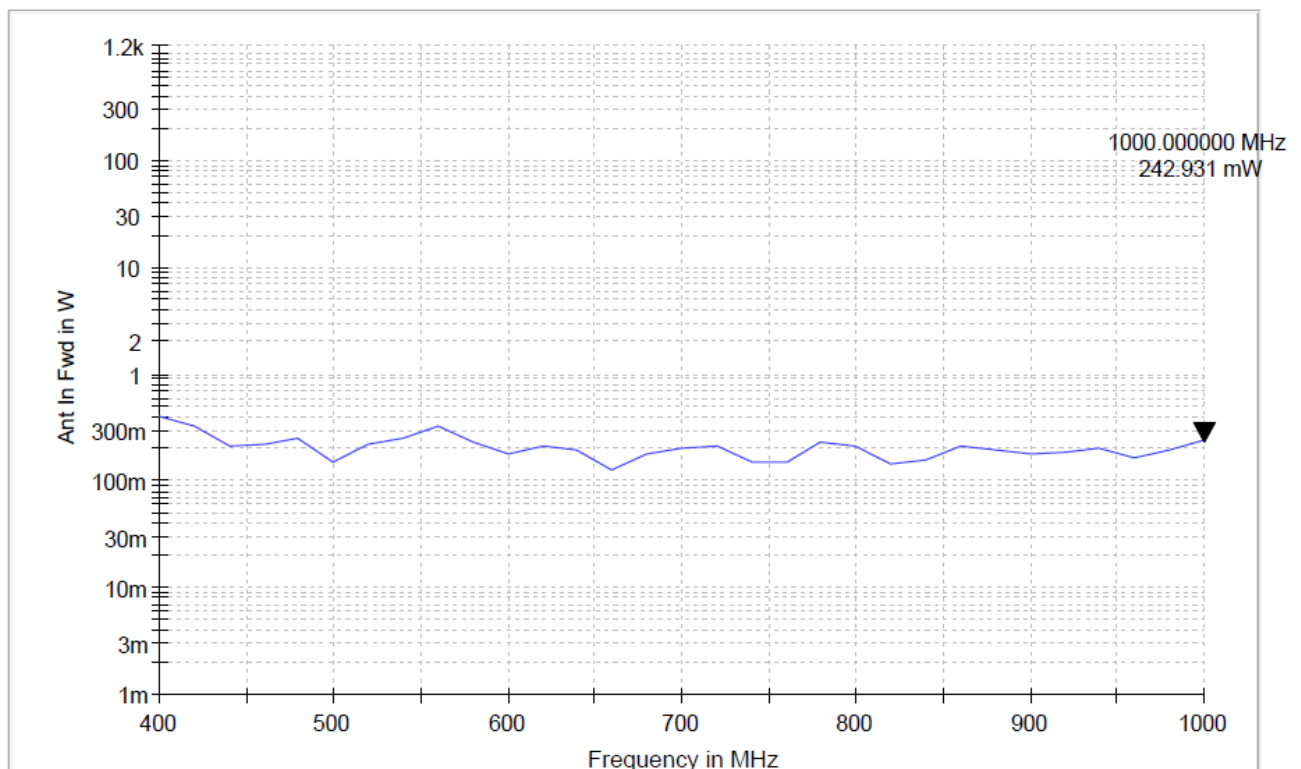
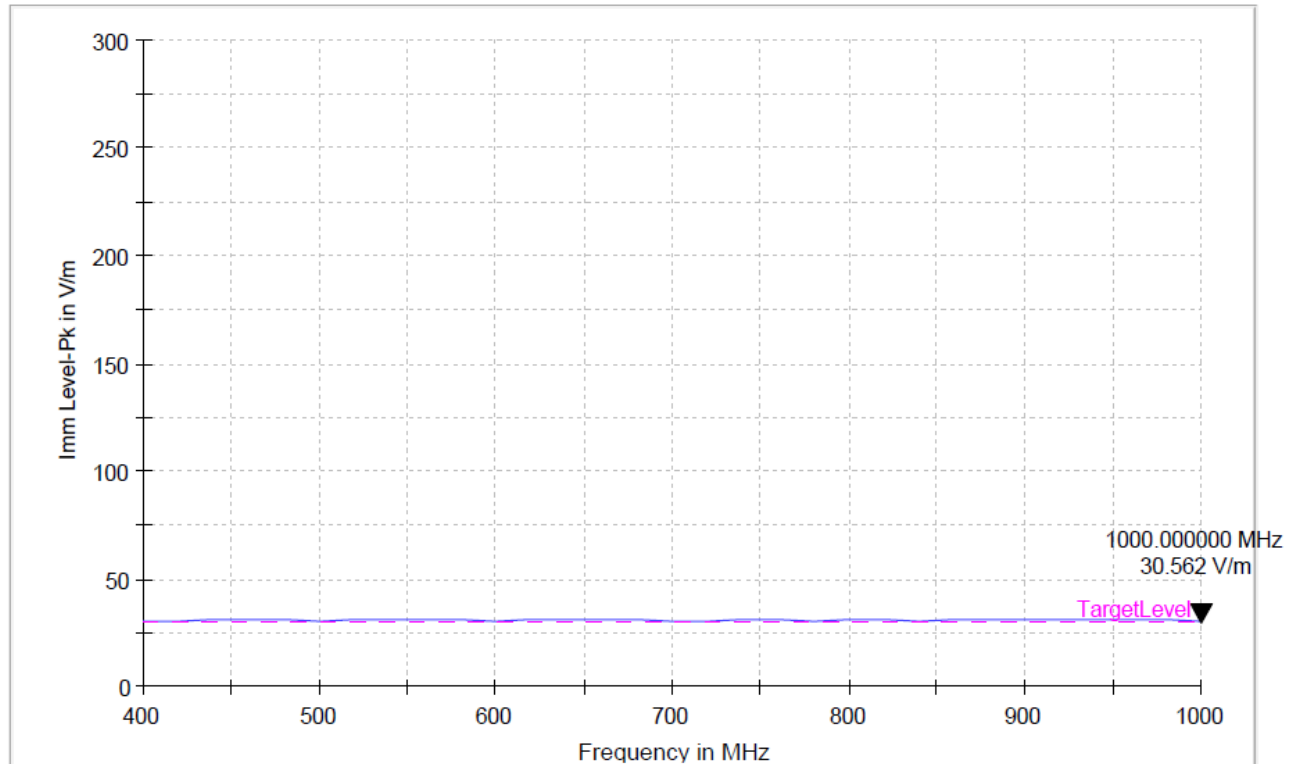
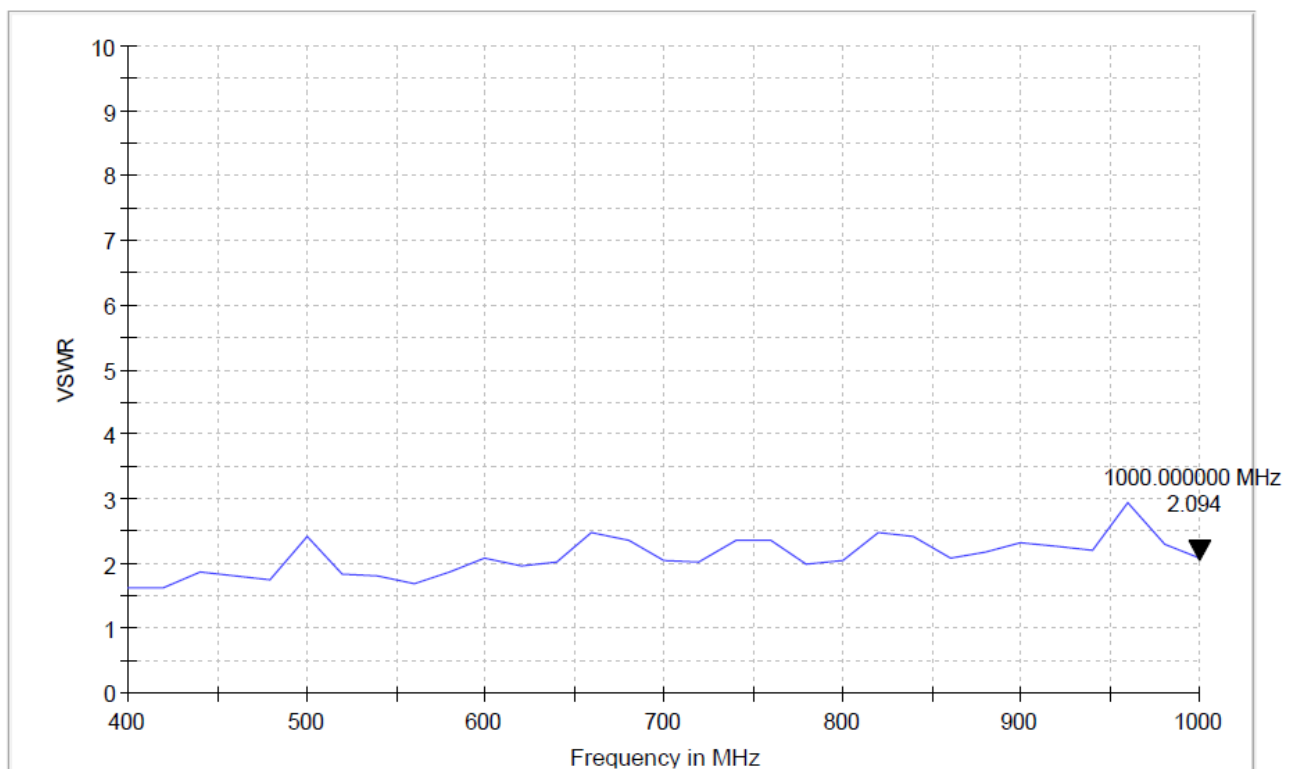
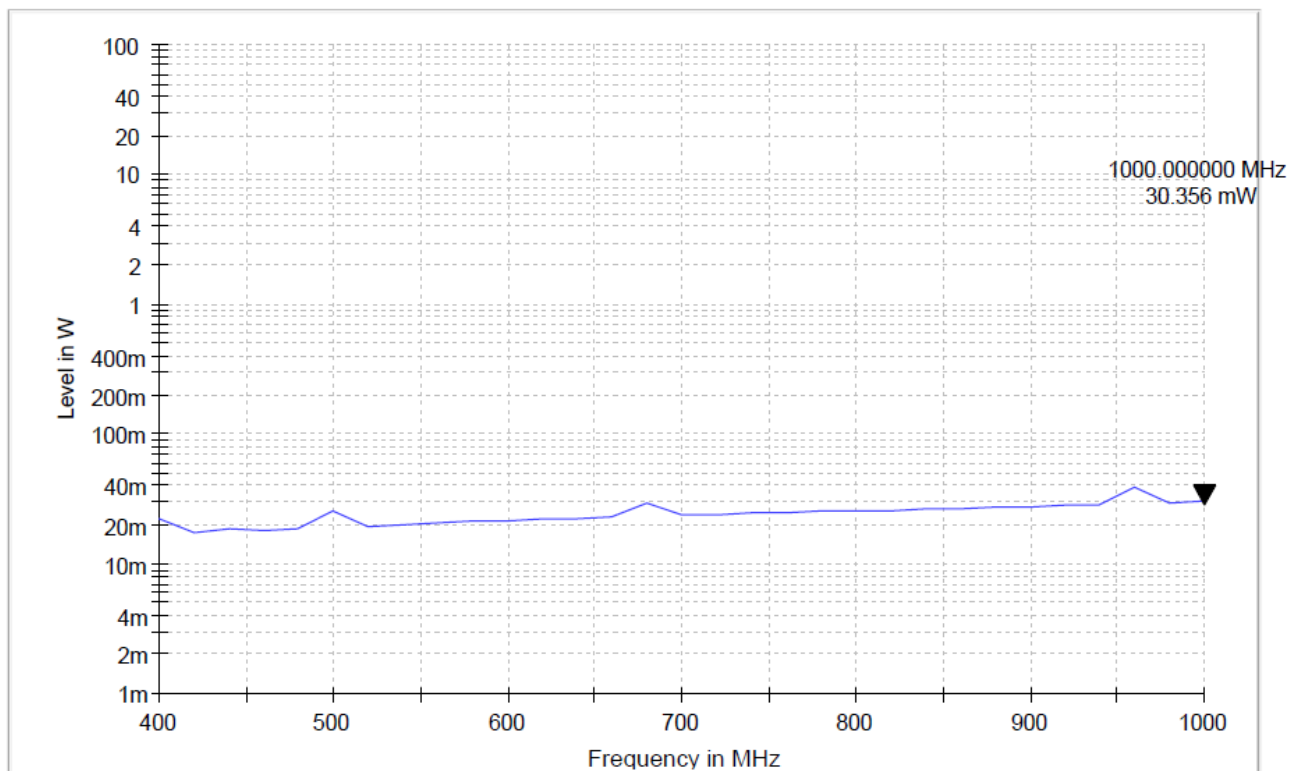


Figure 7: Radio frequency electromagnetic field for standstill mode for 400MHz-1000MHz





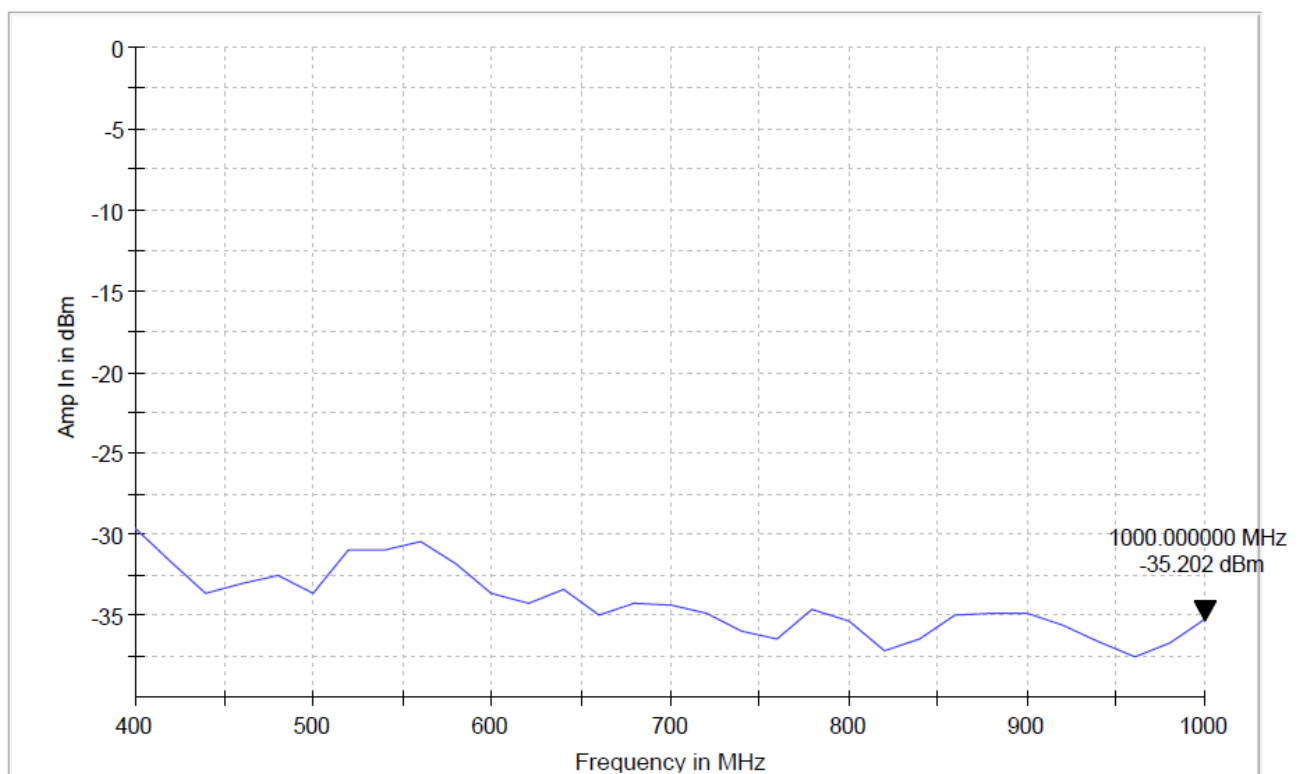
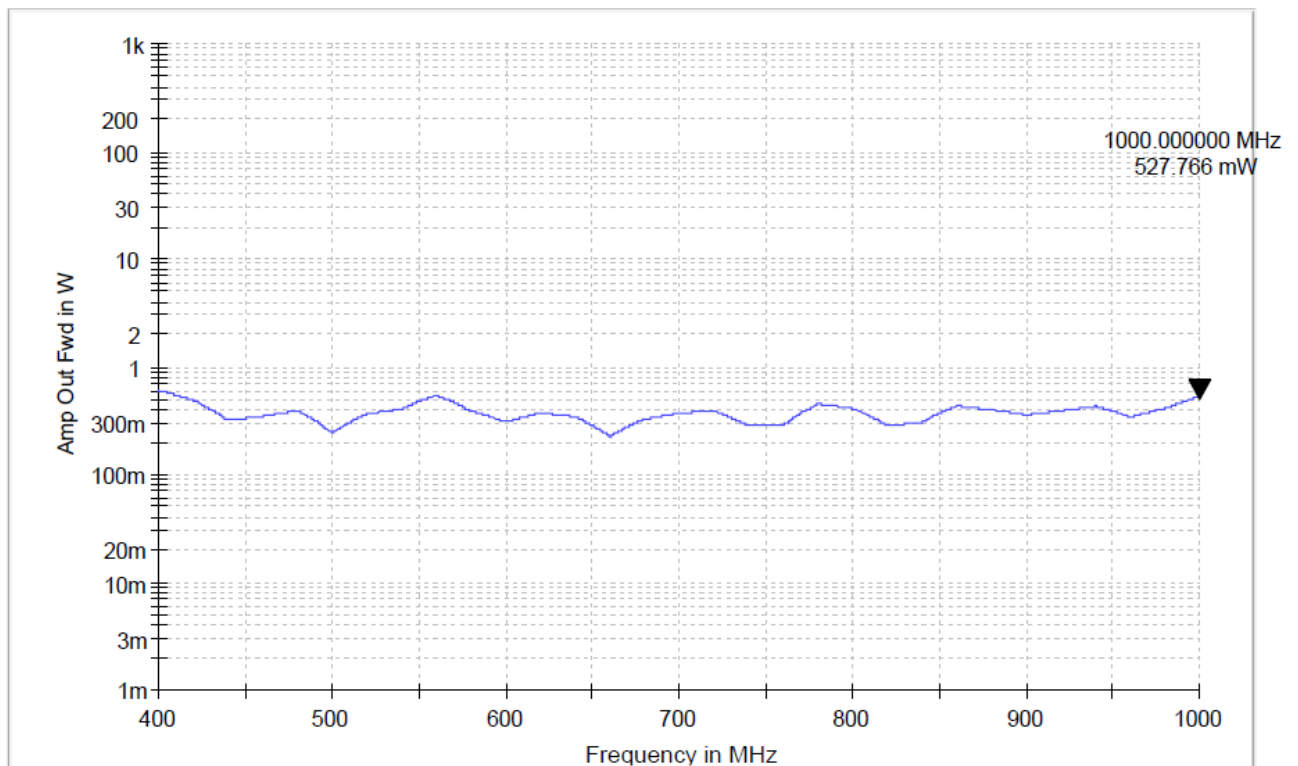
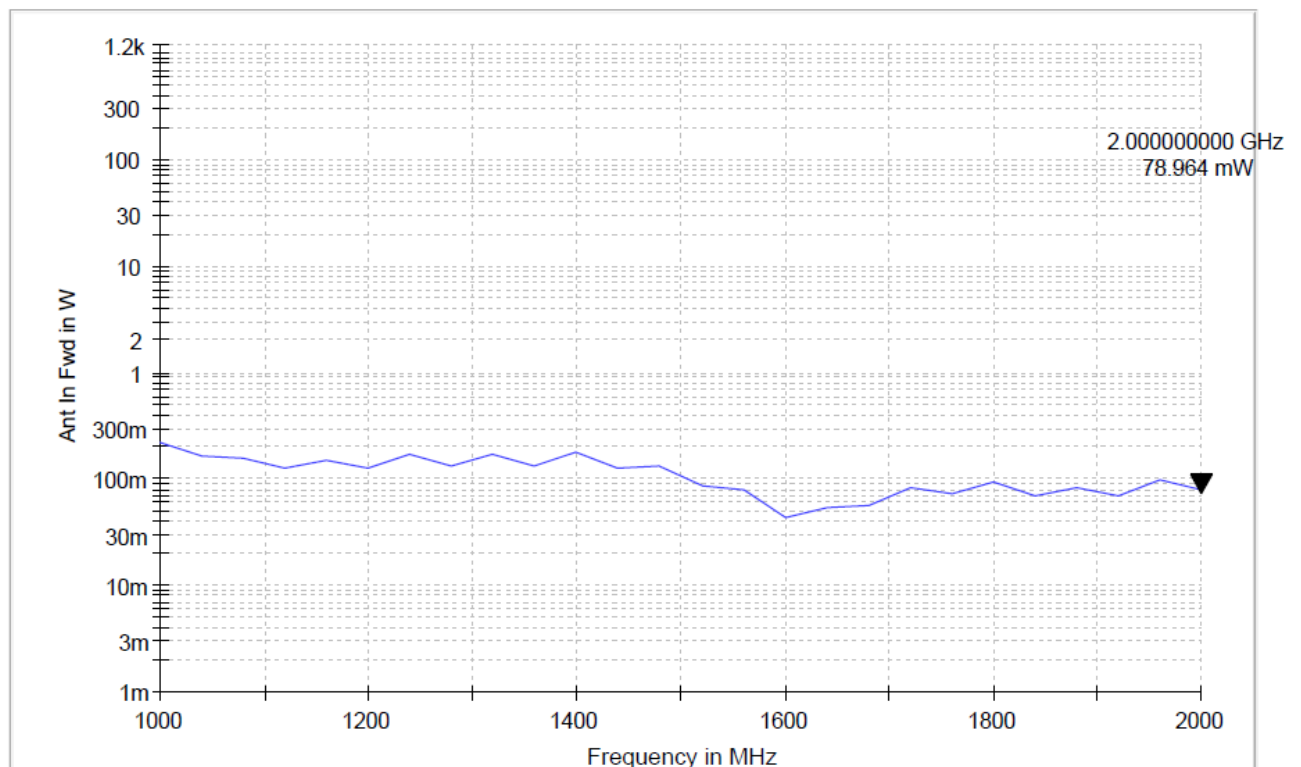
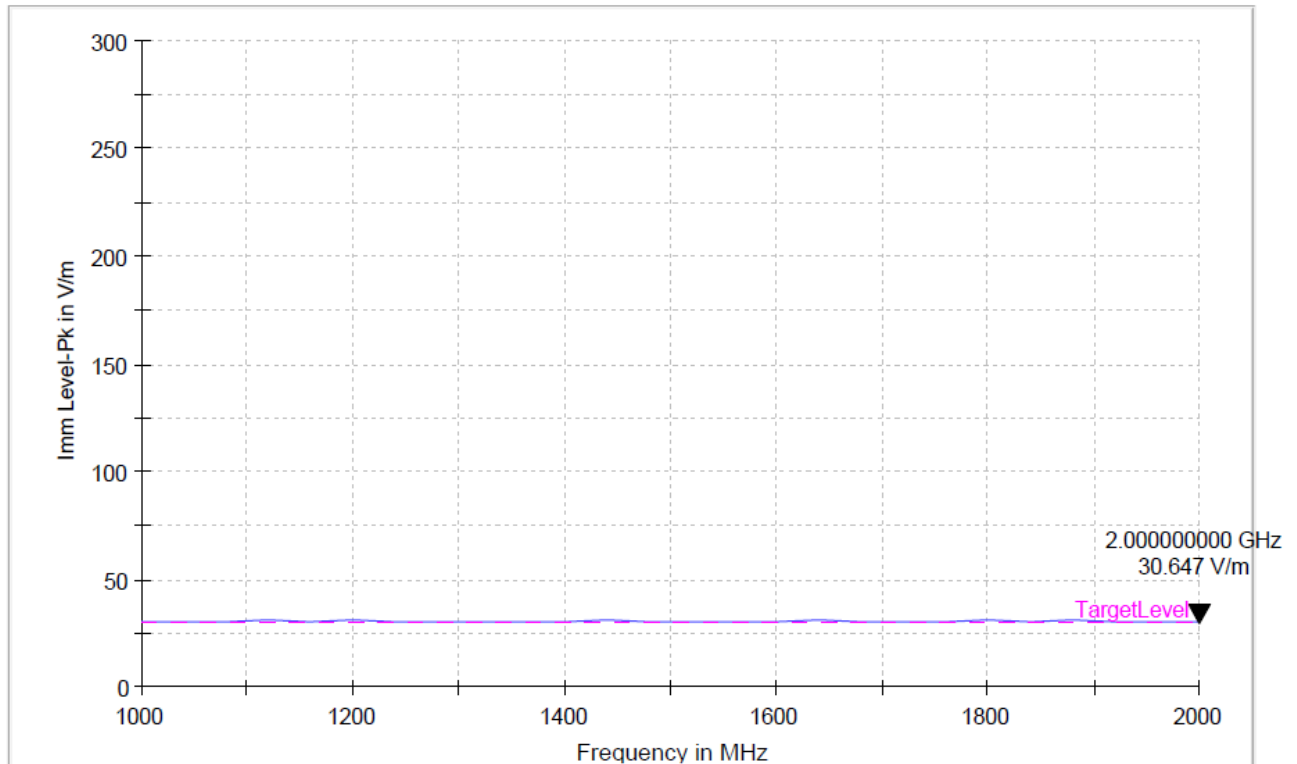
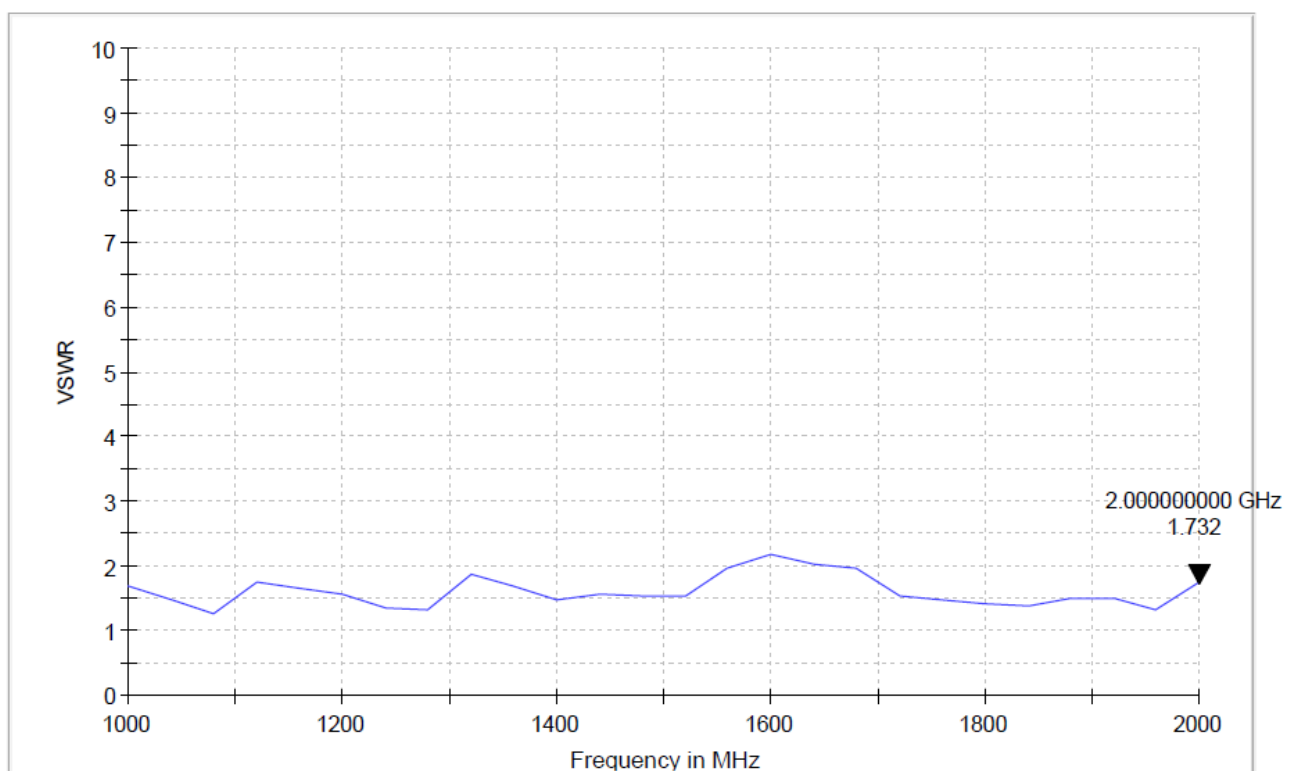
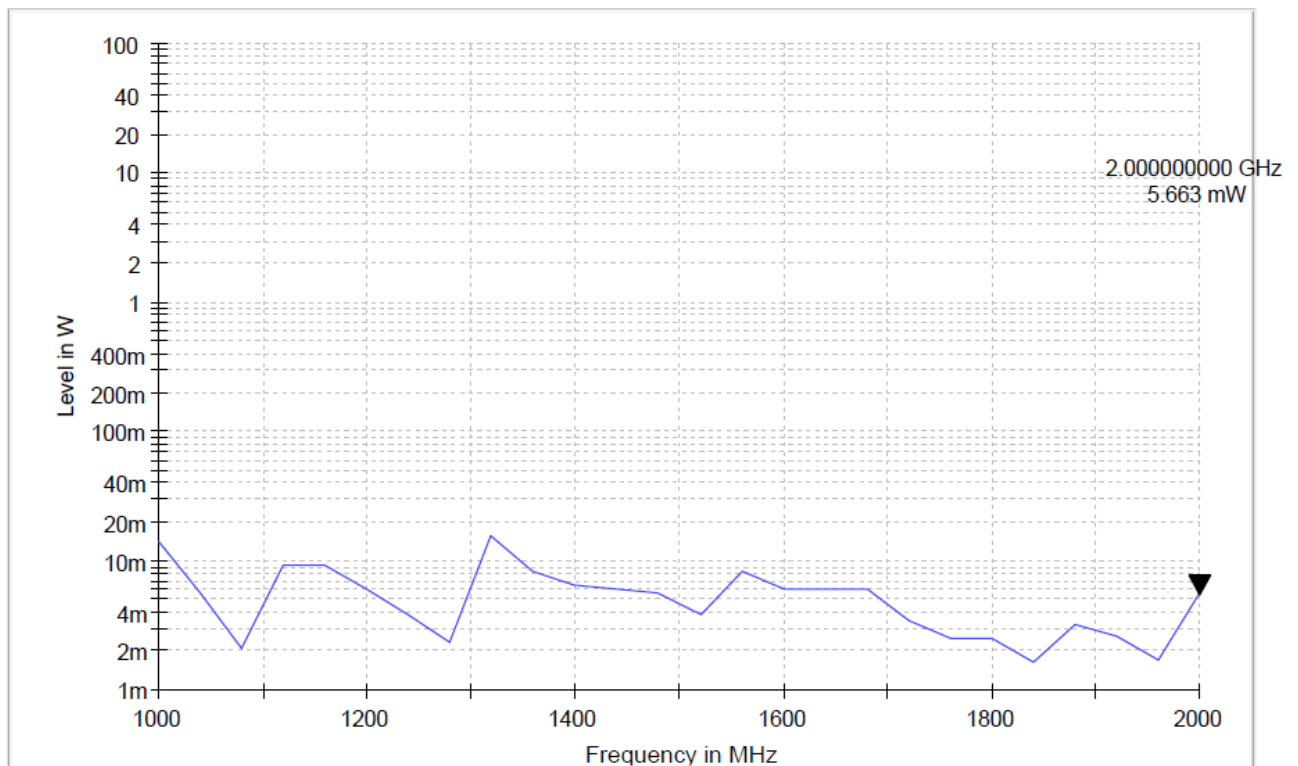


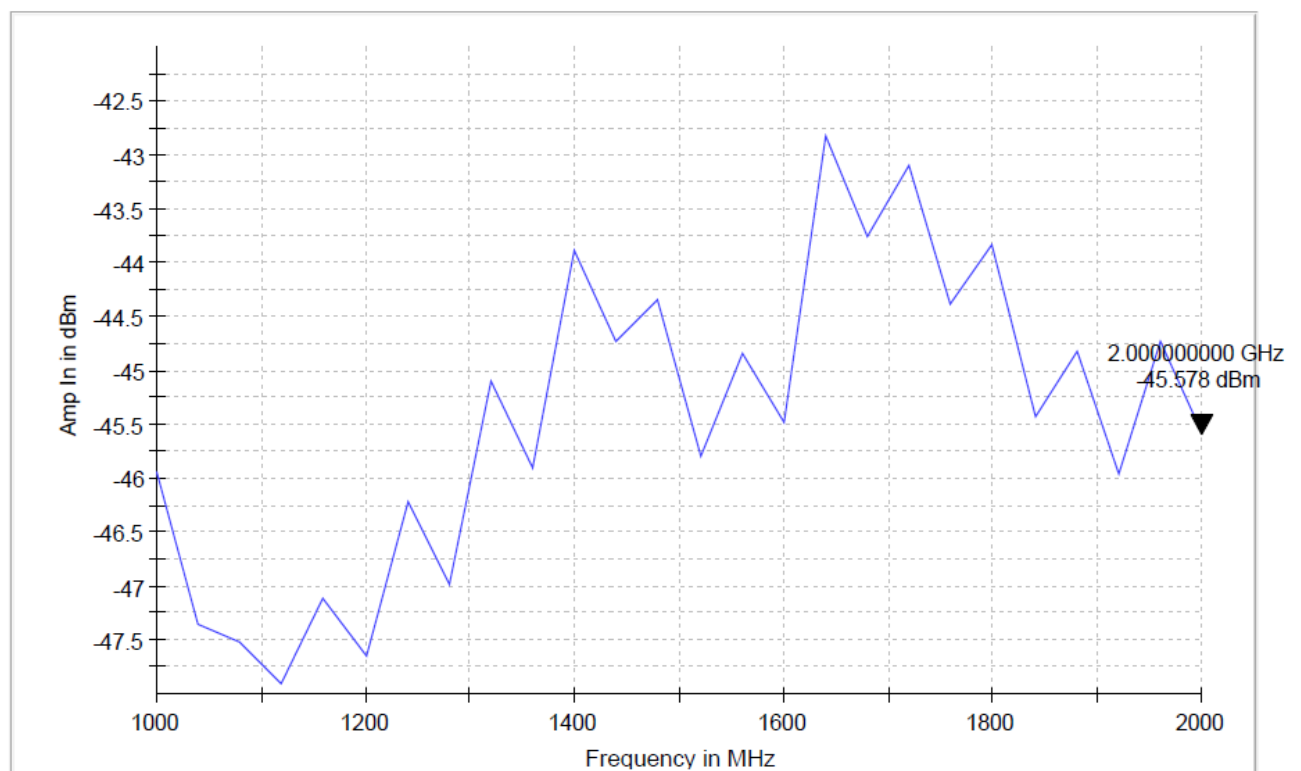
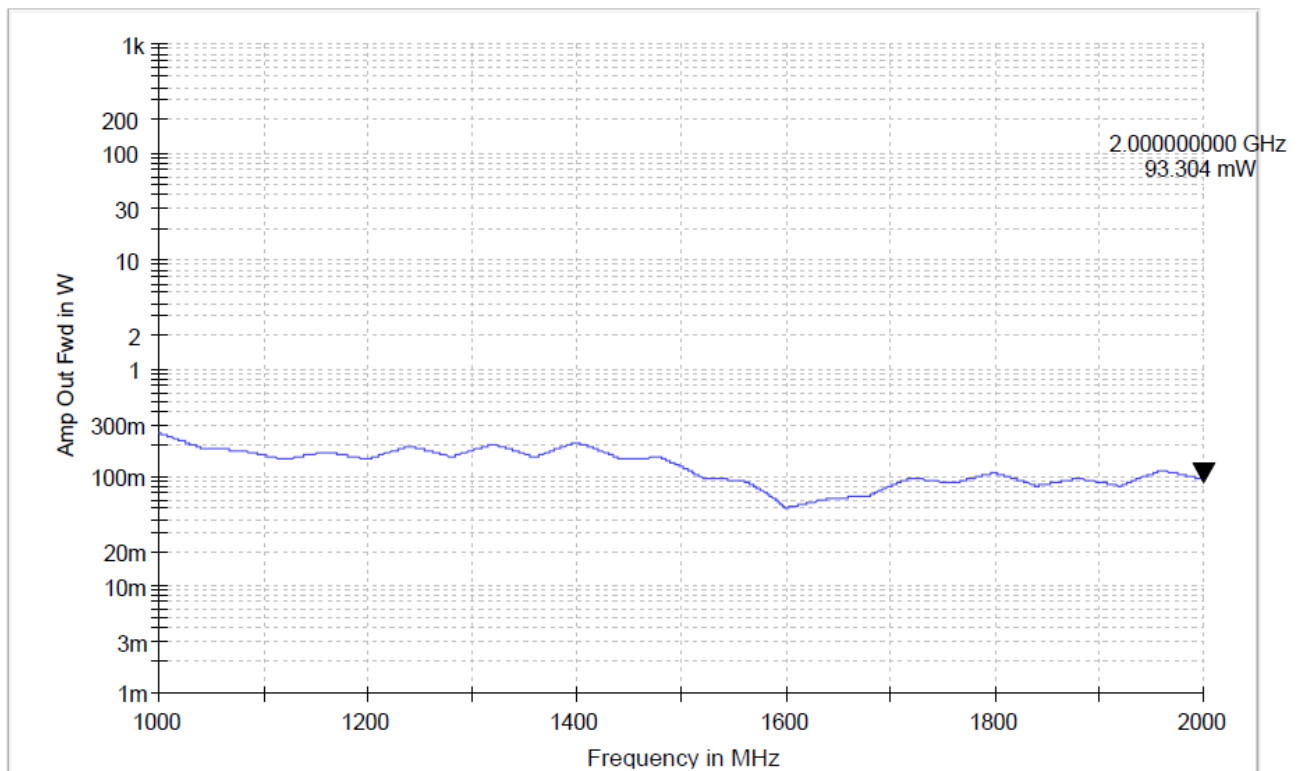
Figure 8: Radio frequency electromagnetic field for standstill mode for 1000MHz-2000MHz



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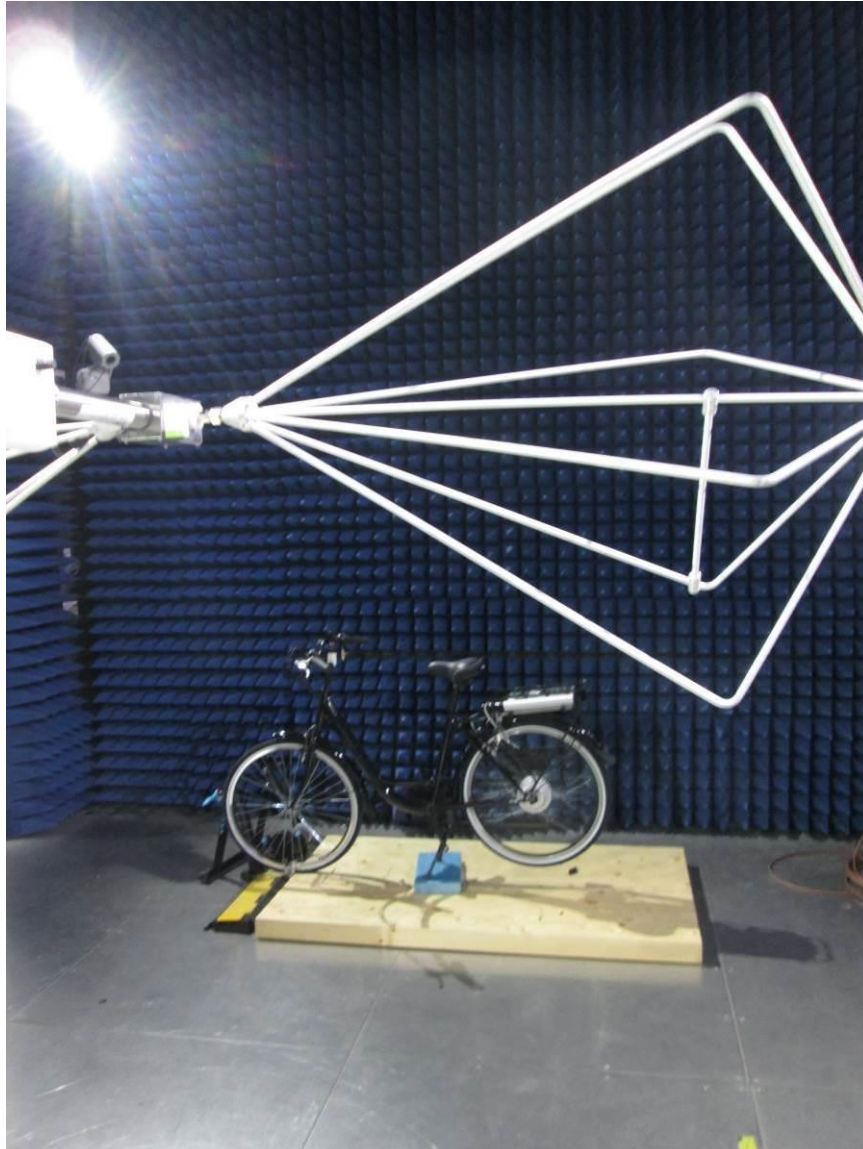
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6 Photographs of the Test Set-Up

Photograph 1: Set-up for measurement of broad-band and narrow-band radiated electromagnetic field emission

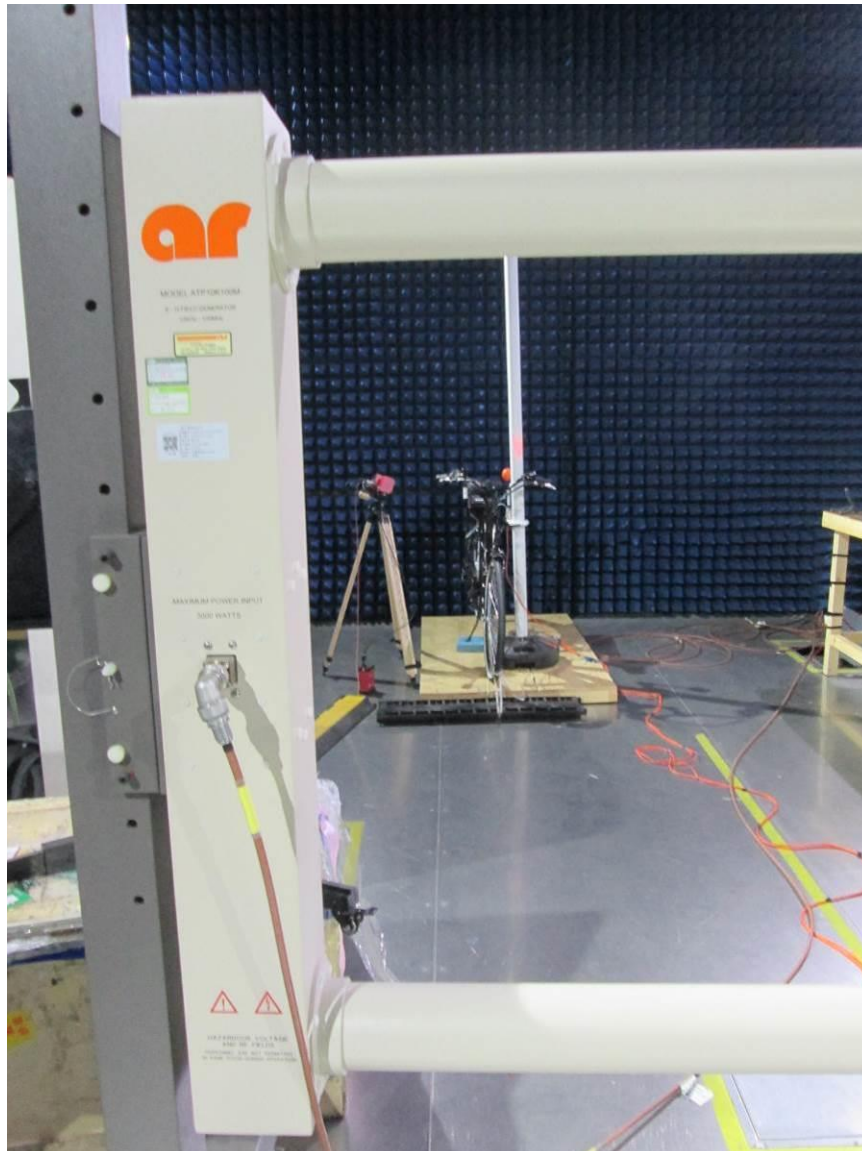


30MHz-200MHz

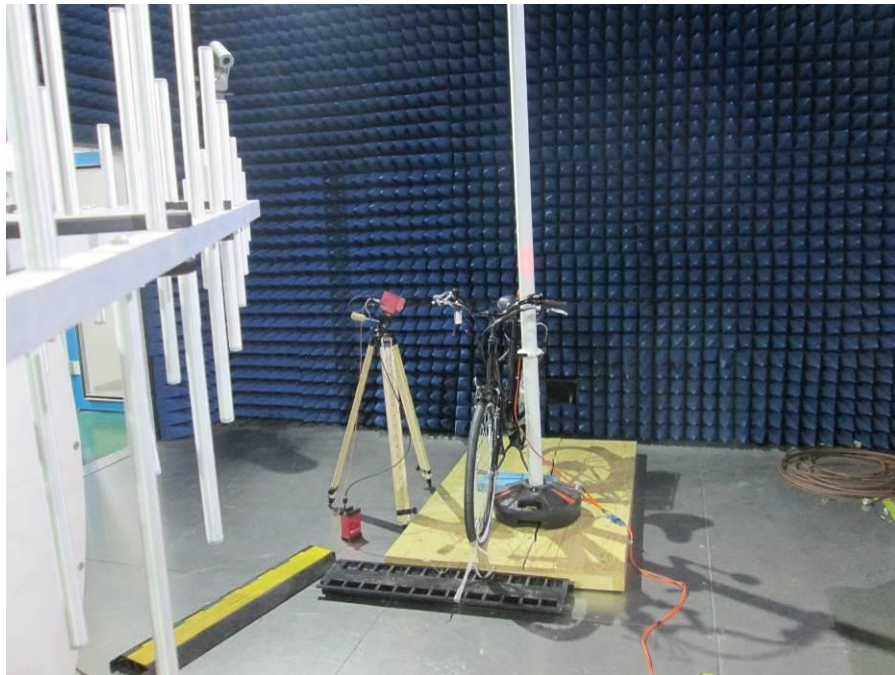


200MHz-1000MHz

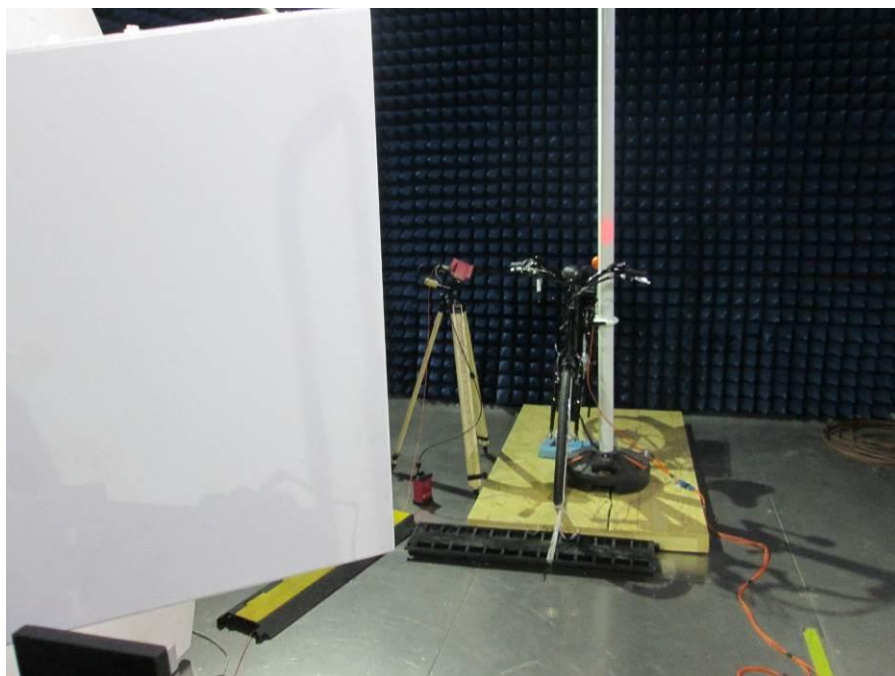
Photograph 2: Set up for RF radiated immunity test



20MHz-80MHz



80MHz-1GHz



1GHz-2GHz

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