Report No.SH13100012E01

FCC EMC TEST REPORT

Issued to

Elatec GmbH

For

Data transmission unit

Model Name	:	TCPConv 2
Trade Name	:	Elatec
Brand Name	:	Elatec
Standard	:	47 CFR Part 15 Subpart B
FCC ID		WP5TCP2B1
Test date	:	Otc.16,2013 to Otc.17,2013
Issue date	:	Otc.17,2013

by

Shenzhen MORLAB Communication Technology Co., Ltd.

Tested by Zhang Jie
Zhang Jie

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CTIA Authorized Test Lab LAB CODE 20081223-00 IEEE 1725 OTA | OFTA 電訊管理局 | ilac-MRA | TAF Testing Laboratory 2030 | GCF Official Observer of Global Certification Forum | Bluetooth BQTF | FCC Reg. No.741109

DIRECTORY

Change History

Issue	Date	Reason for change
1.0	Otc.17,2013	First edition

1. General Information

1.1 Applicant

Elatec GmbH
Lilienthalstr. 3 82178 Puchheim, Germany

1.2 Manufacturer

Shanghai Zhixing Information Technology Co.Ltd
Room 302, No.12, Lane 458, Anning Rd, Minhang, Shanghai, P.R. China.200240

1.3 Description of EUT

EUT Type ..... :	Data transmission unit	
Brand Name..... :	Elatec	
Trade Name ..... :	Elatec	
Model Name ..... :	TCPConv 2	
Hardware Version ..... :	B/C	
Software Version ..... :	SB1.00/STD1.00.02	
Power supply ..... :	Charger	
	Model No.:	FRA018-S05-I
	Brand Name:	Mean Well
	Rated Input:	AC 100-240V, 0.7A,50-60Hz
	Rated Output:	DC 5V,2.4A
	Manufacturer:	RicMar

NOTE：
For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

2. Facilities and Accreditations

2.1 Test Facility

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572. A 9*6*6(m) fully anechoic chamber was used for the radiated spurious emissions test.

2.2 Environmental Conditions

Ambient temperature: 15~35°C
Relative humidity: 30~60%
Atmosphere pressure: 86-106kPa

2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.
Uncertainty of Conducted Emission: ±1.76dB
Uncertainty of Radiated Emission:±3.16dB

2.4 List of Equipments Used

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
3m Semi-anechoic Chamber	czchengyu	9m*6m*6m	SAR	2012.09.14	3years
EMI Test Receiver	R&S	ESCI7	100787	2013.06.24	1year
Spectrum Analyzer	R&S	FSU26	200880	2013.06.24	1year
Broadband Trilog Antenna	Schwarzbeck	VULB 9163	9163-561	2012.07.25	3year
Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-1033	2012.07.25	3year
Dual-line V-network	TESTQ	NNB 51	33285	2013.06.26	1year
Receiver	Rohde&Schwarz	ESCI3	100666	2013.09.25	1year
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2013.09.25	1year
Test Antenna - Bi-Log	Rohde&Schwarz	HL562	100385	2013.09.28	1year
System Simulator	Rohde&Schwarz	CMU200	105571	2013.09.25	1year
LISN	Rohde&Schwarz	ENV216	812744	2013.09.25	1year

NOTE:
Equipments listed above have been calibrated and are in the period of validation.

2.5 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

No.	Identity	Document Title
1	47 CFR Part 15 (10-28-13 Edition)	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Result
1	15.107	Conducted Emission	PASS
2	15.109	Radiated Emission	PASS
3	ANSI C63.4-2009	Radiated Emission	PASS

3. Test Conditions Setting

3.1 Test Mode

1:The EUT configuration of the emission tests was EUT＋PC+ Charger+USB flash disk.
Mode 1:Operating Mode
In this test mode, the EUT is connected with a PC via a special LAN cable. During the measurement, the date is transmitting between the PC and the EUT.

NOTE:
All configurations and test modes are performed, only the worst case is recorded in this report..

4. Emission Tests

4.1 Conducted Emission Measurement

4.1.1 Limits of Conducted Emission:

According to FCC section 15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

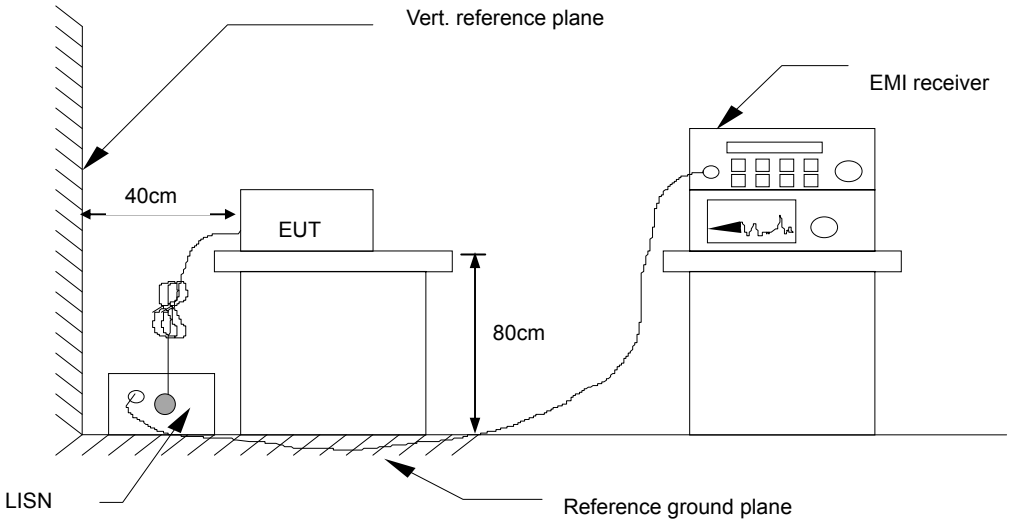
Frequency (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

NOTE:
(1) The limit subjects to the Class B digital device.
(2) The lower limit shall apply at the band edges.
(3) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

4.1.2 Test Procedure

The EUT and support equipment, if needed, were set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
The EUT installed by AC main power, through a Line Impedance Stabilization Network (LISN), which was supplied power source and was grounded to the ground plane.
All support equipment power received from a second LISN.
The test program of the EUT was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
The Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
During the above scans, the emissions were maximized by cable manipulation.
The test mode(s) described in Item 3.1 were scanned during the preliminary test.
After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.
The worst configuration of EUT and cable of the above highest emission level were recorded for reference of the final test.

4.1.3 Test Setup



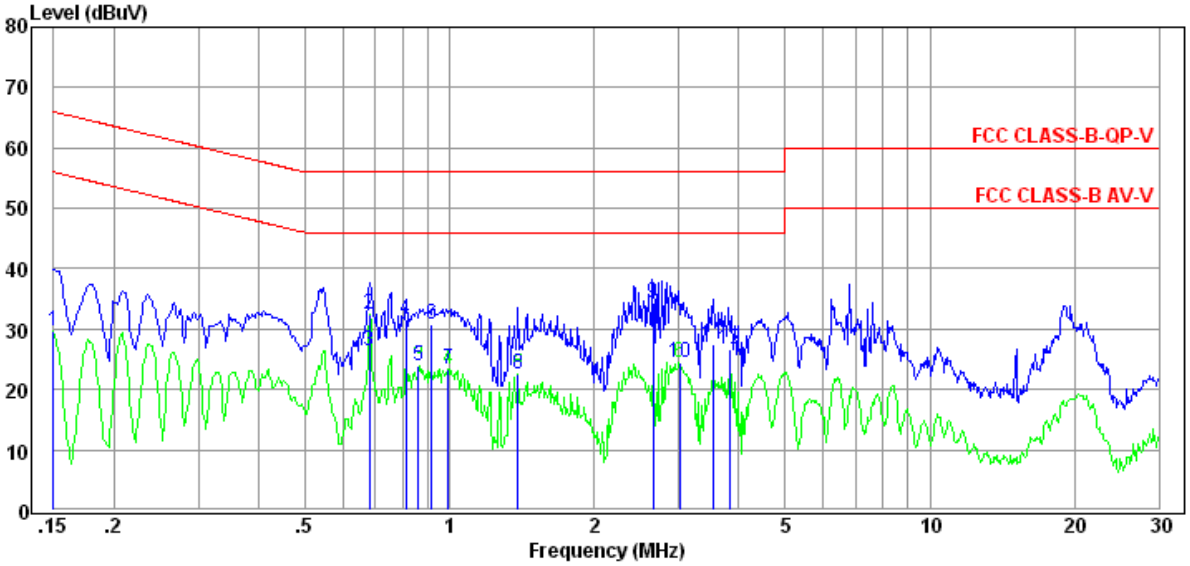
4.1.4 Test Result

Test Verdict Recorded for Suspicious Points:

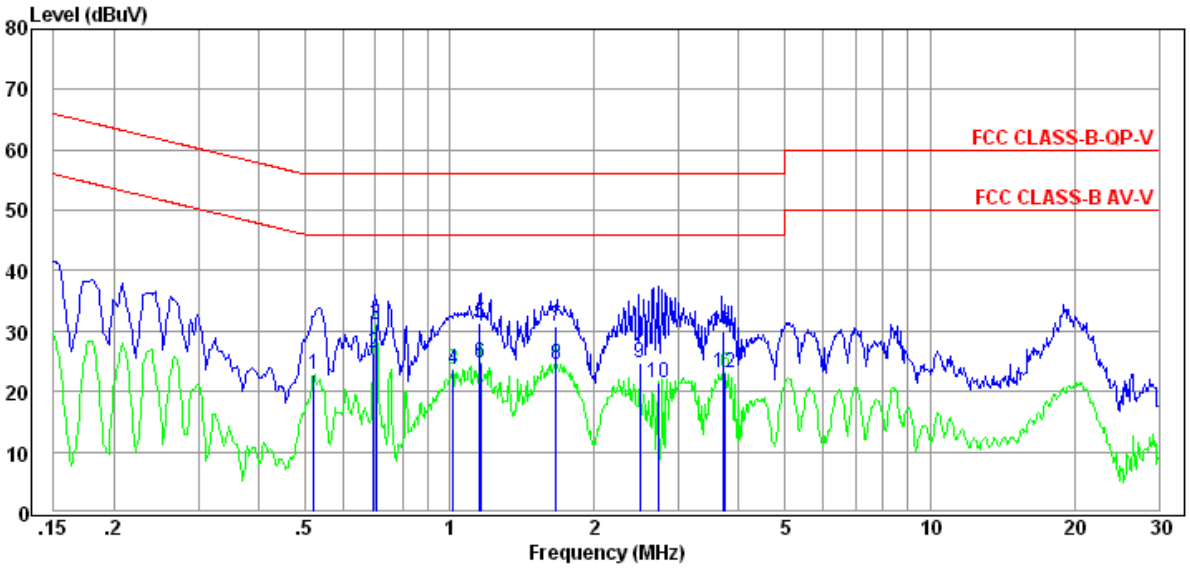
Line	Freq MHz	C.F dB	Result dBuV/m	Limit dBuV/m	Margin dB
Average	0.15	9.63	29.68	56.00	26.32
Average	0.68	9.69	32.52	46.00	13.48
QP	0.68	9.69	26.46	56.00	29.54
QP	0.81	9.69	31.61	56.00	24.39
Average	0.86	9.70	23.85	46.00	22.15
QP	0.92	9.68	30.82	56.00	25.18
Average	1.00	9.60	23.38	46.00	22.62
Average	1.39	9.69	22.50	46.00	23.50
QP	2.66	9.88	34.34	56.00	21.66
Average	3.01	9.91	24.60	46.00	21.40
QP	3.55	9.85	27.60	56.00	28.40
QP	3.82	9.83	26.72	56.00	29.28

Neutral	Freq MHz	C.F dB	Result dBuV/m	Limit dBuV/m	Margin dB
Average	0.52	9.68	22.71	46.00	23.29
QP	0.70	9.68	26.50	56.00	29.50
Average	0.70	9.68	30.98	46.00	15.02
Average	1.02	9.60	23.56	46.00	22.44
QP	1.16	9.64	31.45	56.00	24.55
Average	1.16	9.64	24.71	46.00	21.29
QP	1.67	9.76	30.81	56.00	25.19
Average	1.67	9.76	24.59	46.00	21.41
QP	2.50	9.86	24.84	56.00	31.16
QP	2.73	9.90	21.37	56.00	34.63

Test Plot:



(Plot A: L Phase)



(Plot B: N Phase)

4.2 Radiated Emission Measurement

4.2.1 Limits of Radiated Emission

According to FCC section 15.109, the field strength of radiated emissions from unintentional radiators at a certain distance shall not exceed the following values:

Frequency (MHz)	Field Strength CLASS B (at 3m)	
	μV/m	dBμV/m
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

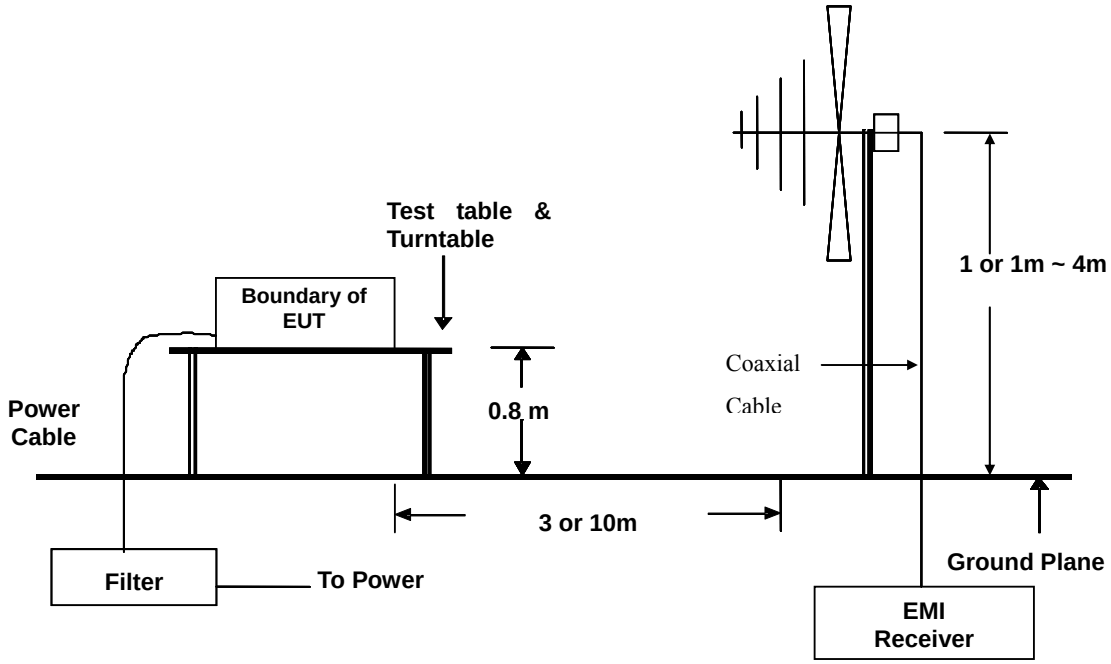
Frequency (MHz)	Field Strength CLASS A (at 10m)	
	μV/m	dBμV/m
30 - 88	90	39.0
88 - 216	150	43.5
216 - 960	210	46.4
Above 960	300	49.5

NOTE:
*(1) Field Strength (dBμV/m) = 20*log[Field Strength (μV/m)].*
(2) In the emission tables above, the tighter limit applies at the band edges.

4.2.2 Test Procedure

The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
Support equipment, if needed, was placed as per ANSI C63.4.
All I/O cables were positioned to simulate typical usage as per ANSI C63.4.
The EUT received AC power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
The antenna was placed at 3 or 10 meter away from the EUT as stated in ANSI C63.4. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
The Analyzer / Receiver quickly scanned from 30MHz to 40GHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
The test mode(s) described in Item 3.1 were scanned during the preliminary test:
After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.
The worst configuration of EUT and cable of the above highest emission level were recorded for reference of the final test.

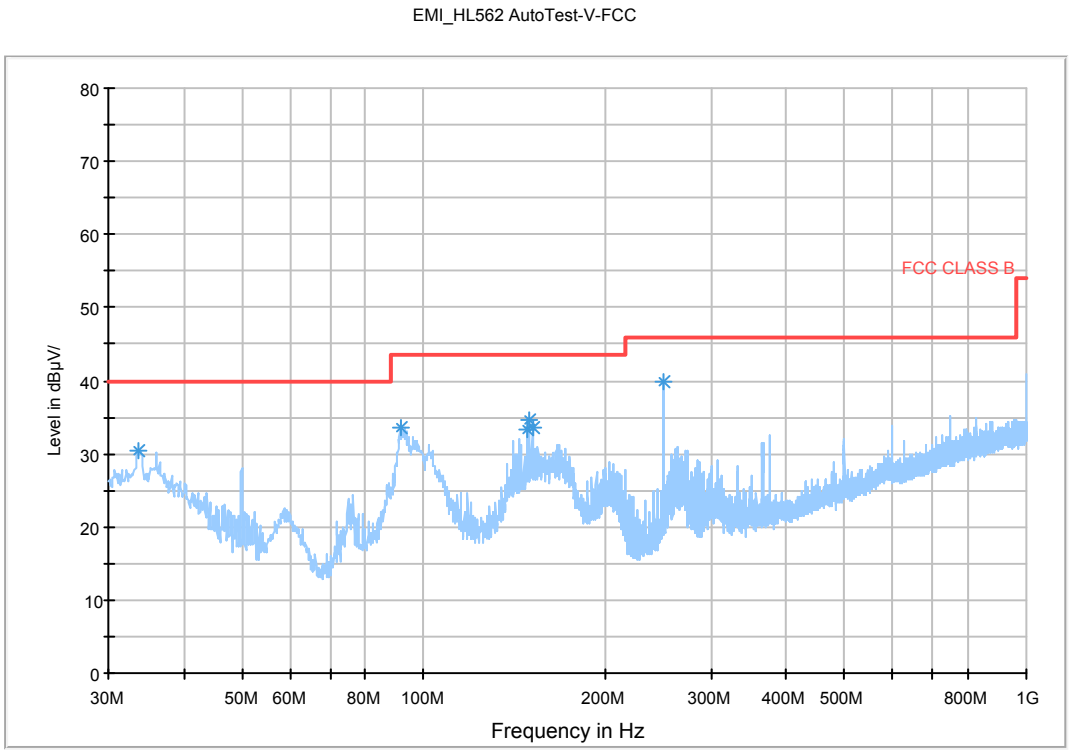
4.2.3 Test Setup



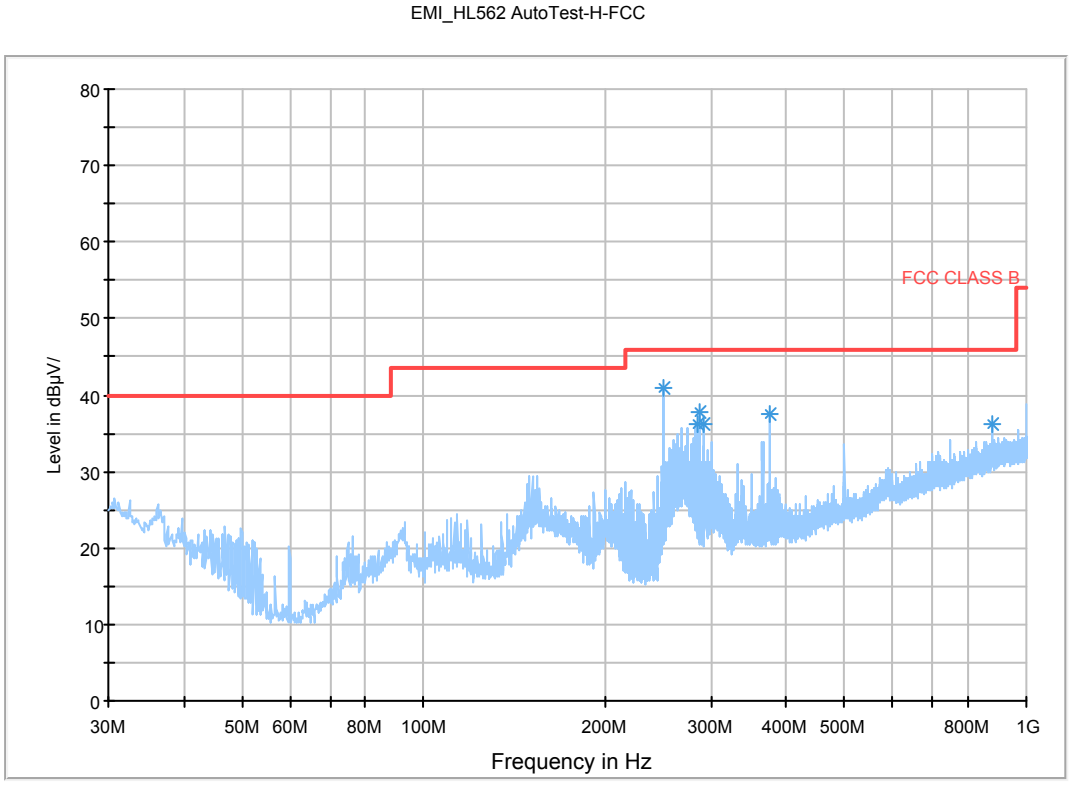
4.2.4 Test Result

No.	@Frequency (MHz)	Emission Level (dBμV/m)		Quasi-Peak Limit (dBμV/m)	Margin (dBμV/m)	Result
		QP (dBμV/m)	Antenna Polarization			
1	33.637500	30.5	V	40.0	9.5	PASS
2	91.473750	33.5	V	43.5	10.0	PASS
3	148.461250	33.2	V	43.5	10.3	PASS
4	149.916250	34.5	V	43.5	9.0	PASS
5	151.492500	33.7	V	43.5	9.8	PASS
6	249.947500	39.9	V	46.0	6.1	PASS
7	249.947500	40.9	H	46.0	5.1	PASS
8	284.988750	36.1	H	46.0	9.9	PASS
9	288.020000	37.8	H	46.0	8.2	PASS
10	292.506250	36.1	H	46.0	9.9	PASS
11	375.077500	37.5	H	46.0	8.5	PASS
12	875.112500	36.2	H	46.0	9.8	PASS

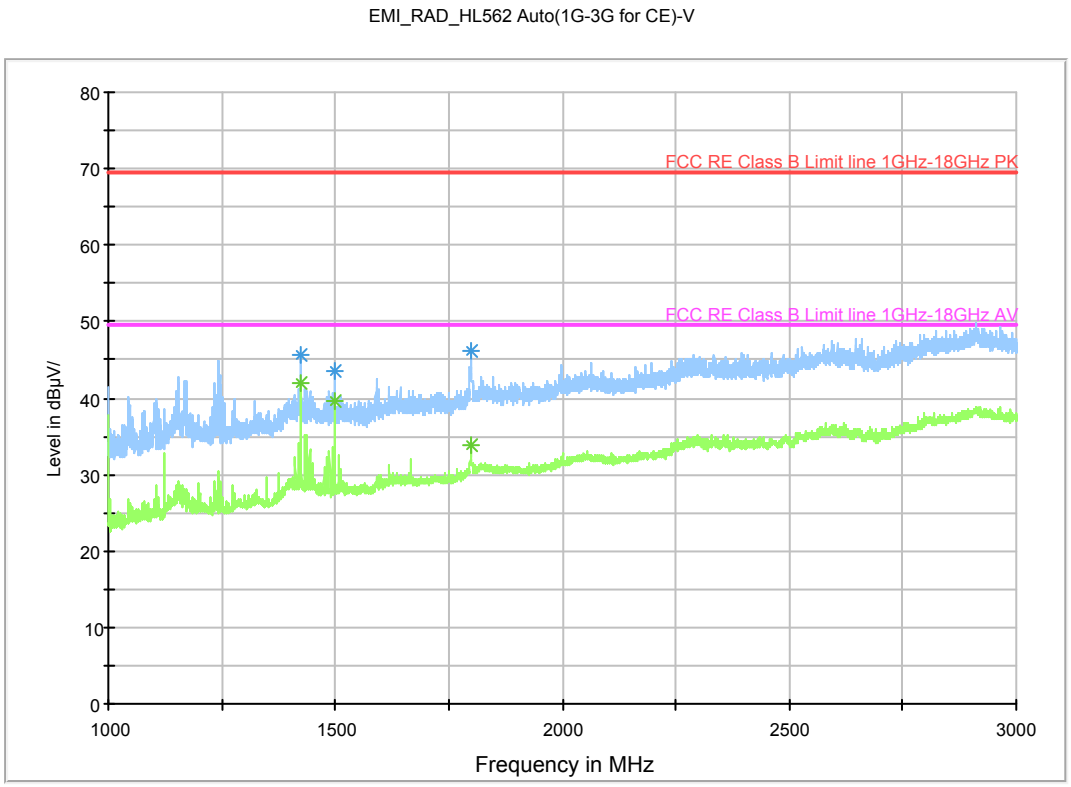
Test Plot:



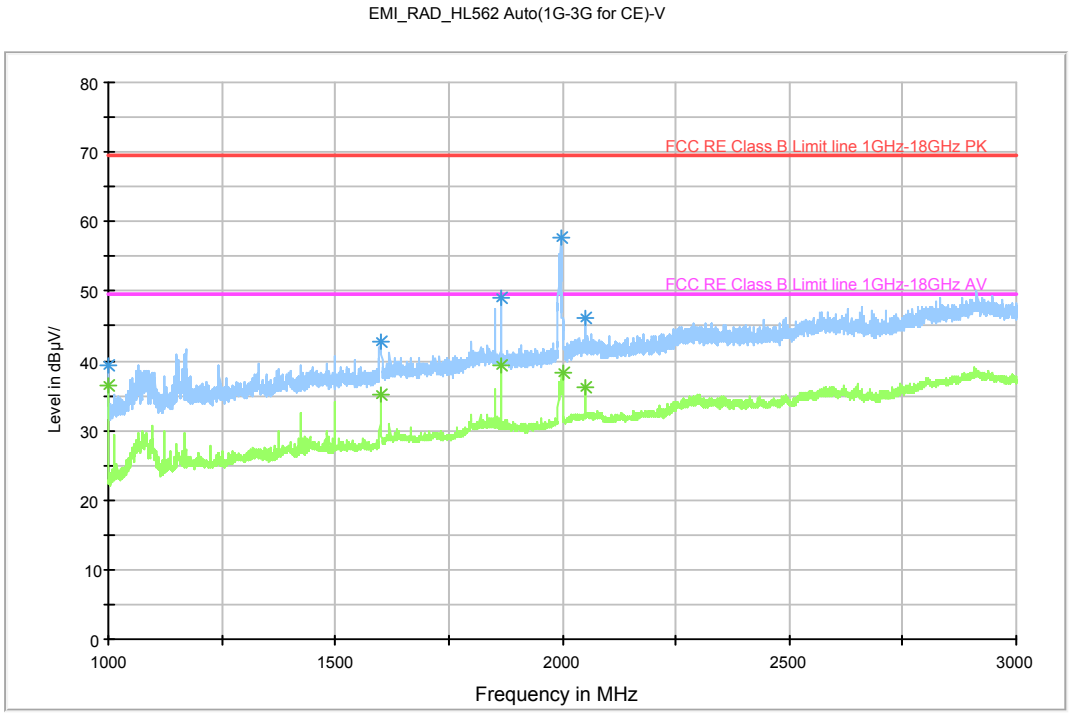
(Plot A: Test Antenna Vertical Frequence from 30MHz to1GHz)



(Plot B: Test Antenna Horizontal Frequence from 30MHz to1GHz)



(Plot C: Test Antenna Vertical Frequence from 1GHz to 3GHz)



(Plot D: Test Antenna Horizontal Frequence from 1GHz to 3GHz)

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