



Part 15C

TEST REPORT

Product Name Smartisan T1
Model SM701
FCC ID 2AEUYSM701
Applicant Smartisan Technology Co., Ltd
Manufacturer Smartisan Technology Co., Ltd
Date of issue July 22, 2015

TA Technology (Shanghai) Co., Ltd.

TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1505-0075RF06R1

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GENERAL SUMMARY

Reference Standard(s)	<p>FCC CFR47 Part 15C (2013) Radio Frequency Devices</p> <p>15.107 Conducted limits.</p> <p>15.225 Operation within the band 13.110–14.010 MHz</p> <p>15.207 Conducted limits;</p> <p>15.209 Radiated emission limits; general requirements;</p> <p>ANSI C63.4 Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 KHz to 40GHz. (2009)</p>
Conclusion	<p>This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 2 of this test report are below limits specified in the relevant standards.</p> <p>General Judgment: Pass</p>
Comment	The test result only responds to the measured sample.

Approved by



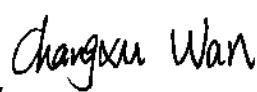
Kai Xu
Director

Revised by



Lingling Kang
RF Manager

Performed by



Changxu Wan
RF Engineer

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1. General Information

1.1. Notes of the test report

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L2264.

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 428261.

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 8510A.

TA Technology (Shanghai) Co., Ltd. guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and technical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

TA Technology (Shanghai) Co., Ltd. is liable to the client for the maintenance by its personnel of the confidentiality of all information related to the items under test and the results of the test. The sample under test was selected by the Client. This report only refers to the item that has undergone the test.

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of **TA Technology (Shanghai) Co., Ltd.**

If the electronic report is inconsistent with the printed one, it should be subject to the latter.

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1.2. Testing laboratory

Company: TA Technology (Shanghai) Co., Ltd.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City: Shanghai
Post code: 201201
Country: P. R. China
Contact: Xu Kai
Telephone: +86-021-50791141/2/3
Fax: +86-021-50791141/2/3-8000
Website: <http://www.ta-shanghai.com>
E-mail: xukai@ta-shanghai.com

1.3. Applicant Information

Company: Smartisan Technology Co., Ltd
Address: 7th Floor, Motorola Building, 1 East Wangjing Road, Chaoyang District, Beijing, 100102, P.R. China

1.4. Manufacturer Information

Company: Smartisan Technology Co., Ltd
Address: 7th Floor, Motorola Building, 1 East Wangjing Road, Chaoyang District, Beijing, 100102, P.R. China

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1.5. Information of EUT

General information

Name of EUT:	Smartisan T1
IMEI:	864516020010443
Hardware Version:	MMR500003C
Software Version:	V1.5.0
Antenna Type:	Internal Antenna
Device Operating Configurations:	
Test Mode	NFC
Modulation Type:	ASK
Power Supply:	Battery or Charger (AC adaptor)
Operating Frequency:	13.56MHz

1.6. Test Date

The test is performed from June 20, 2015 to June 29, 2015.

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2. Test Information

2.1. Summary of test results

Number	Summary of measurements of results	Clause in FCC rules	Verdict
1	Occupied Bandwidth (20dB)	2.1049	PASS
2	Frequency Stability	15.225(e)	PASS
3	Radiates Emission In-Band	15.225(a)(b)(c)	PASS
4	Radiates Emission Out-of-Band	15.225(d), 15.209	PASS
5	AC Power Line Conducted Emission	15.207	PASS

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2.2. Occupied Bandwidth (20dB)

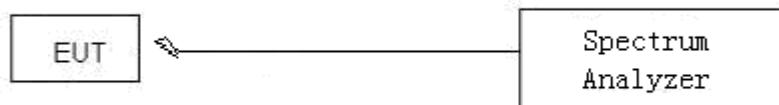
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was placed on the reference antenna which was connected to the spectrum analyzer. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 10 kHz and VBW is set to 30 kHz on spectrum analyzer. -20dB occupied bandwidths are recorded.

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 936$ Hz.

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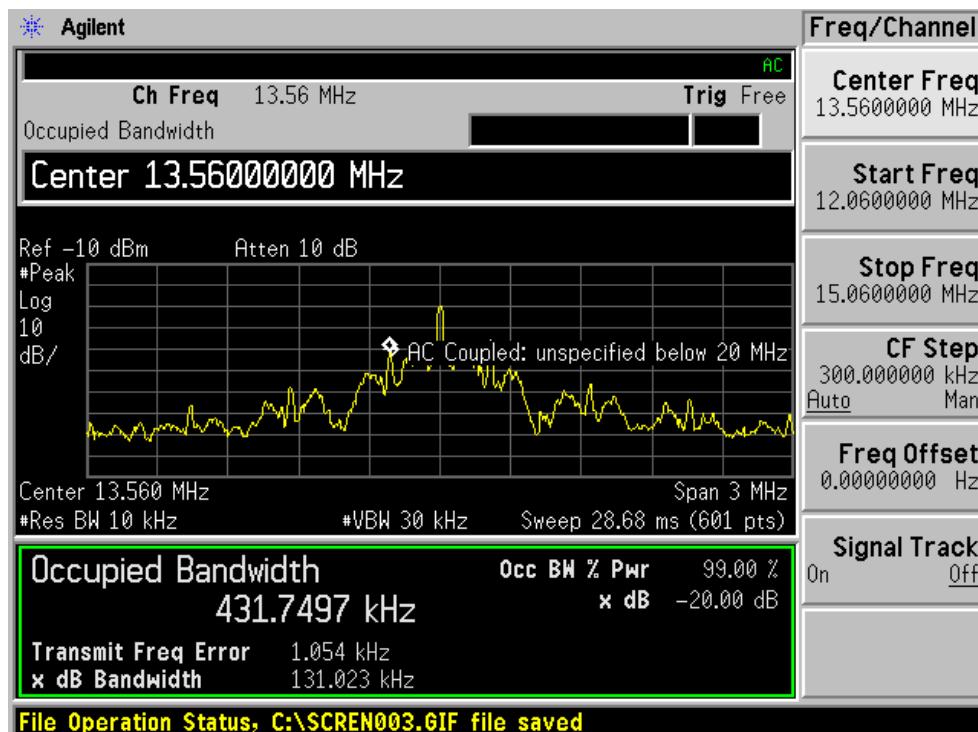
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Test Results

Frequency (MHz)	20dB Bandwidth (kHz)
13.56	131.023



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2.3. Frequency Stability

Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

Method of Measurement

1. Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -20°C to +50°C in 10°C step size,

(1) With all power removed, the temperature was decreased to -20°C and permitted to stabilize for three hours.

(2) Measure the carrier frequency with the test equipment in a "call mode". These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.

(3) Repeat the above measurements at 10°C increments from -20°C to +50°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

2. Frequency Stability (Voltage Variation)

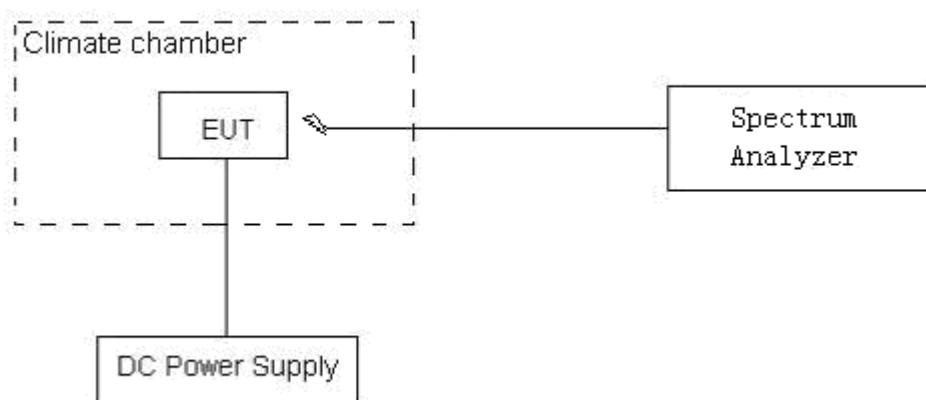
The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 3.4 V and 4.35 V, with a nominal voltage of 3.8V.

Test setup



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Limits

According to the part 15.225, The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor $k = 3, U = 0.01\text{ppm}$.

Test Result

Temperature (°C)	Test Results (%) / 3.8 V Power supply
	13.56MHz
-20	0.000922
-10	0.000037
0	0.000774
10	-0.000701
20	0.007131
30	-0.006453
40	0.001534
50	0.002522

Voltage (V)	Test Results(%) / 20°C
	13.56MHz
3.4	0.001010
3.8	0.007131
4.35	-0.000656

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2.4. Radiates Emission

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	102.5kPa

Method of Measurement

The test set-up was made in accordance to the general provisions of ANSI C63.4-2009. The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.

Sweep the whole frequency band through the range from 9 kHz to the 10th harmonic of the carrier, and the emissions less than 20 dB below the permissible value are reported.

During the test, below 30MHz, the center of the loop shall be 1 meters; above 30MHz, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

Set the spectrum analyzer in the following:

From 150kHz to 490kHz (detector: Peak and Quasi-Peak)

RBW=10kHz / VBW=30kHz / Sweep=AUTO

From 490kHz to 30MHz (detector: Quasi-Peak)

RBW=10kHz / VBW=30kHz / Sweep=AUTO

30MHz to 1GHz (detector: Quasi-Peak)

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz(detector: Peak and Quasi-Peak):

(a) PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.

The test is in transmitting mode.

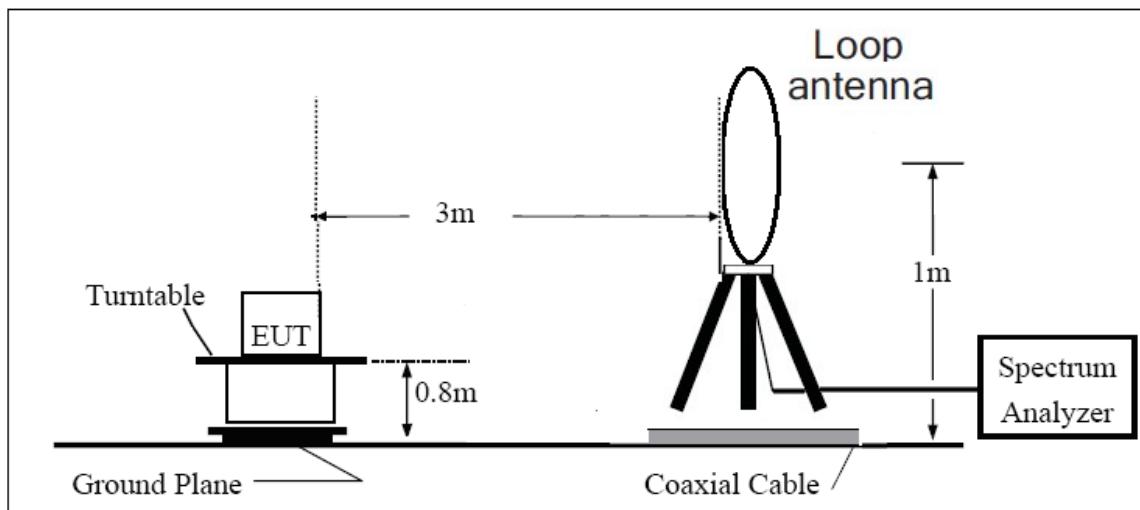
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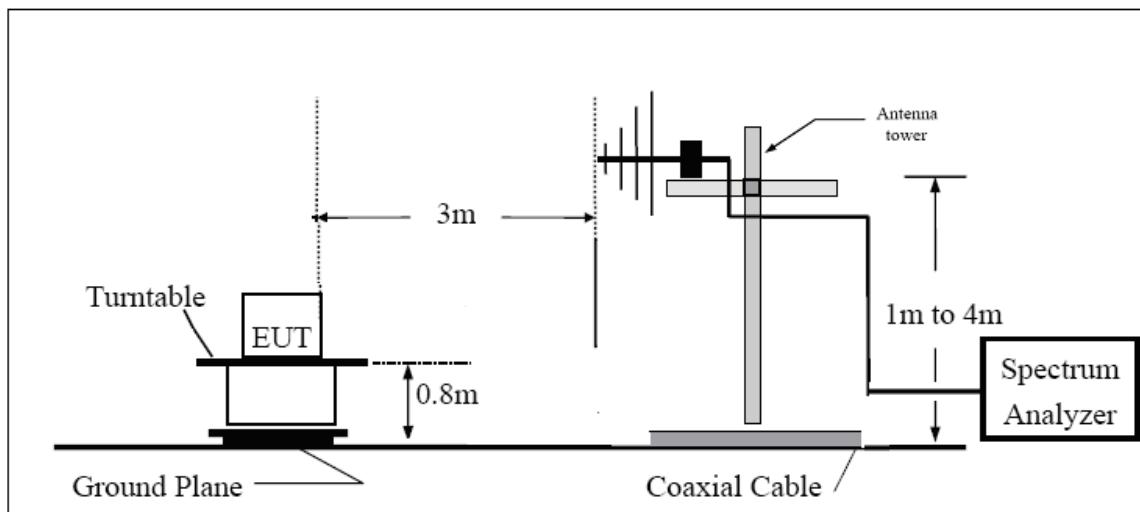
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Test setup

9KHz~~~ 30MHz



30MHz~~~ 1GHz



Limits

Rule Part 15.247(d) specifies that "In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c))."

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Limit in restricted band

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
0.009–0.490	2400/F(kHz)	/
0.490–1.705	24000/F(kHz)	/
1.705–30.0	30	/
30-88	100	40
88-216	150	43.5
216-960	200	46
Above960	500	54

§15.35(b)

There is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

Frequency	Uncertainty
9KHz-30MHz	3.55 dB
30MHz-200MHz	4.19 dB
200MHz-1GHz	3.63 dB

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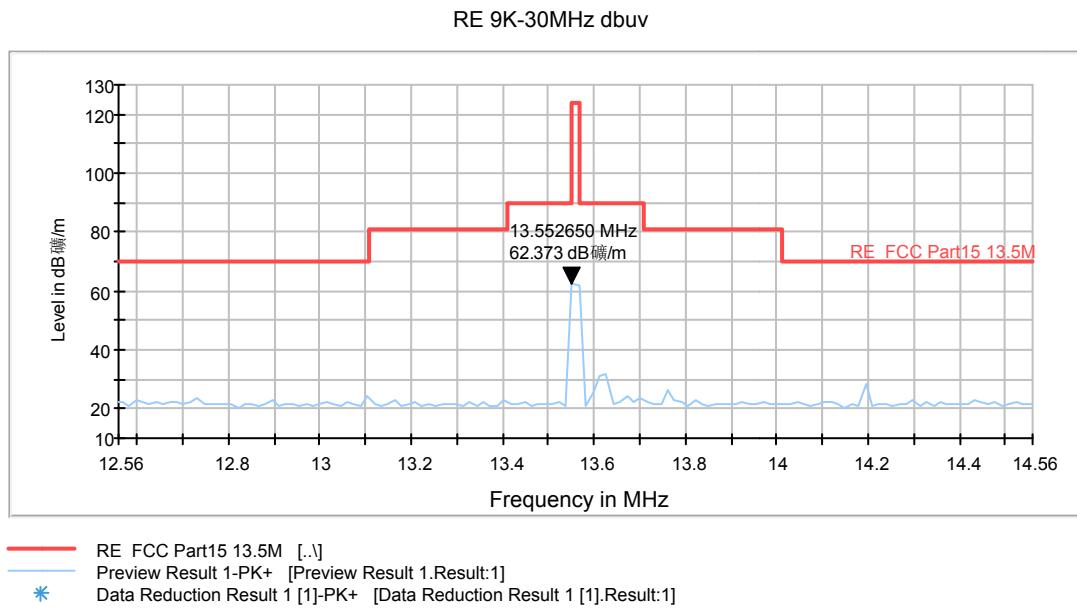
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Test result

In-band



Note: a font (Level in dB_{uV/m}) in the test plot =(level in dB_{uV/m})

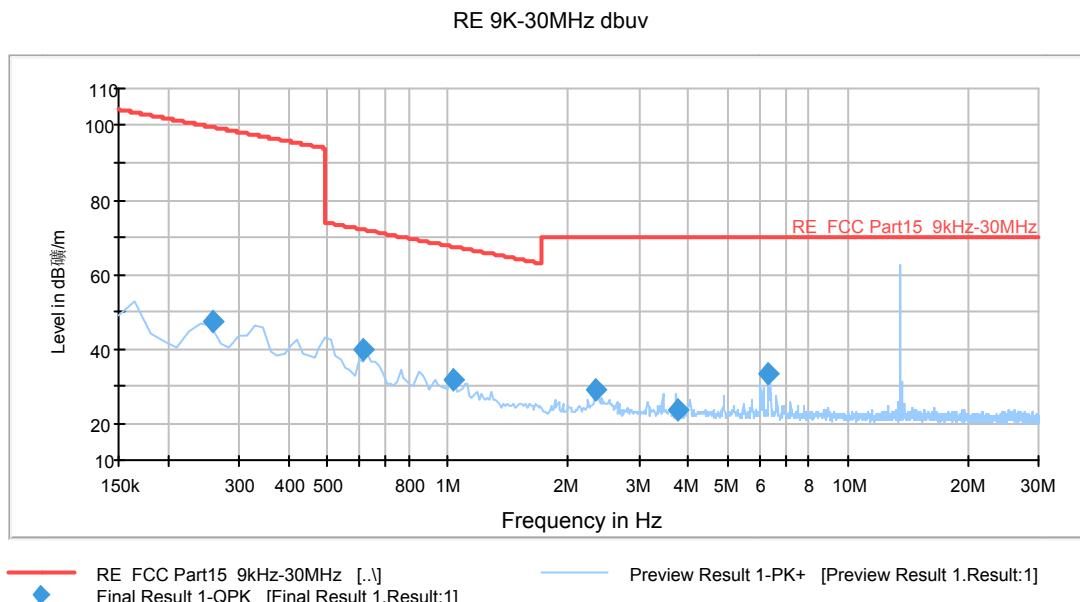
Note: This graph displays the maximum values of horizontal and vertical by software

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Out-of-band



Radiates Emission from 9kHz to 30MHz

Note: This graph displays the maximum values of horizontal and vertical by software

Note: The signal beyond the limit is carrier. a font (_u) in the test plot =(level in dBuV/m)

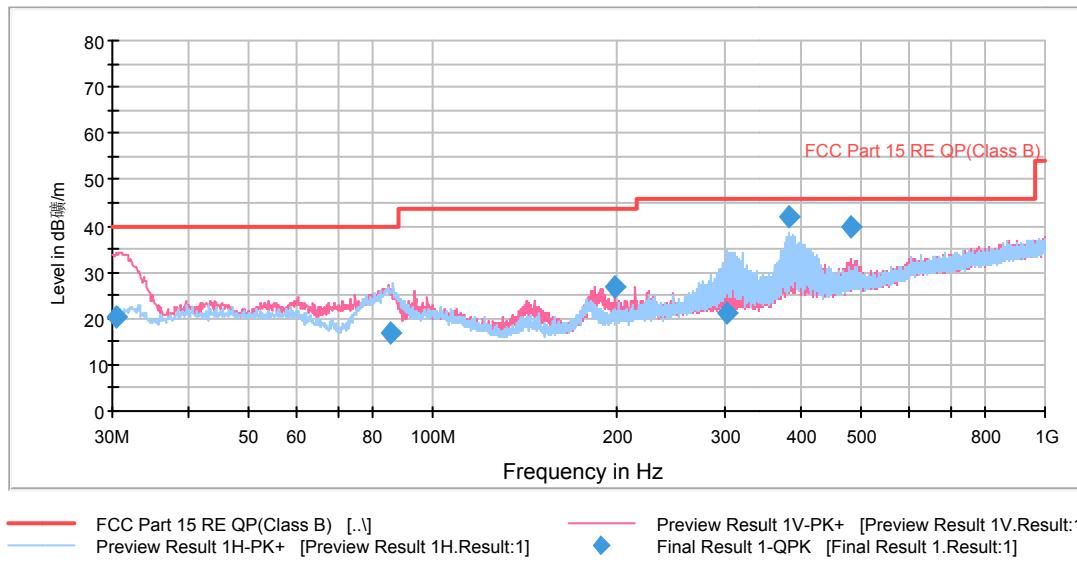
Frequency (MHz)	Quasi-Peak (dBuV/m)	Height (cm)	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
0.257475	47.4	100.0	0.0	66.5	19.1	52.3	99.6
0.614600	39.9	100.0	0.0	59	19.1	32.1	72.0
1.029575	31.5	100.0	0.0	50.6	19.1	35.9	67.4
2.350975	28.9	100.0	0.0	48	19.1	41.1	70.0
3.735000	23.4	100.0	0.0	42.5	19.1	46.6	70.0
6.350875	33.0	100.0	0.0	52.2	19.2	37.0	70.0

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RE 0.03-1GHz QP Class B



Radiates Emission from 30MHz to 1GHz

Note: This graph displays the maximum values of horizontal and vertical by software

Note: a font (Level in dB dBuV/m) in the test plot =(level in dBuV/m)

Frequency (MHz)	Quasi-Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
30.567500	20.4	113.0	V	62.0	32.3	11.9	19.6	40.0
85.700000	16.9	202.0	H	10.0	27.4	10.5	23.1	40.0
198.011250	26.8	214.0	V	10.0	38.7	11.9	16.7	43.5
302.407500	21.3	100.0	H	260.0	36.8	15.5	24.7	46.0
380.816250	42.1	100.0	H	238.0	59.6	17.5	3.9	46.0
483.192500	39.9	100.0	V	85.0	59.4	19.5	6.1	46.0

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2.5. Conducted Emission

Ambient condition

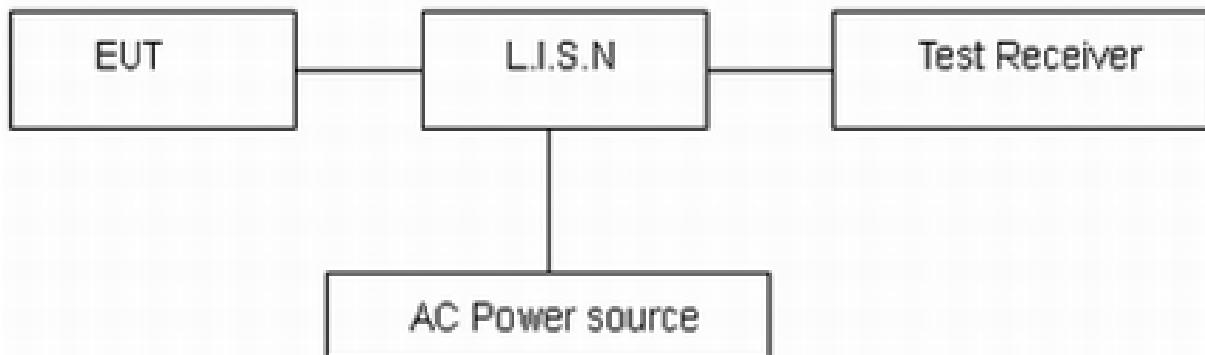
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2009. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

The test is in transmitting mode.

Test Setup



Note: AC Power source is used to change the voltage 110V/60Hz.

Limits

Frequency (MHz)	Conducted Limits(dB μ V)	
	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.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$, $U = 2.69$ dB.

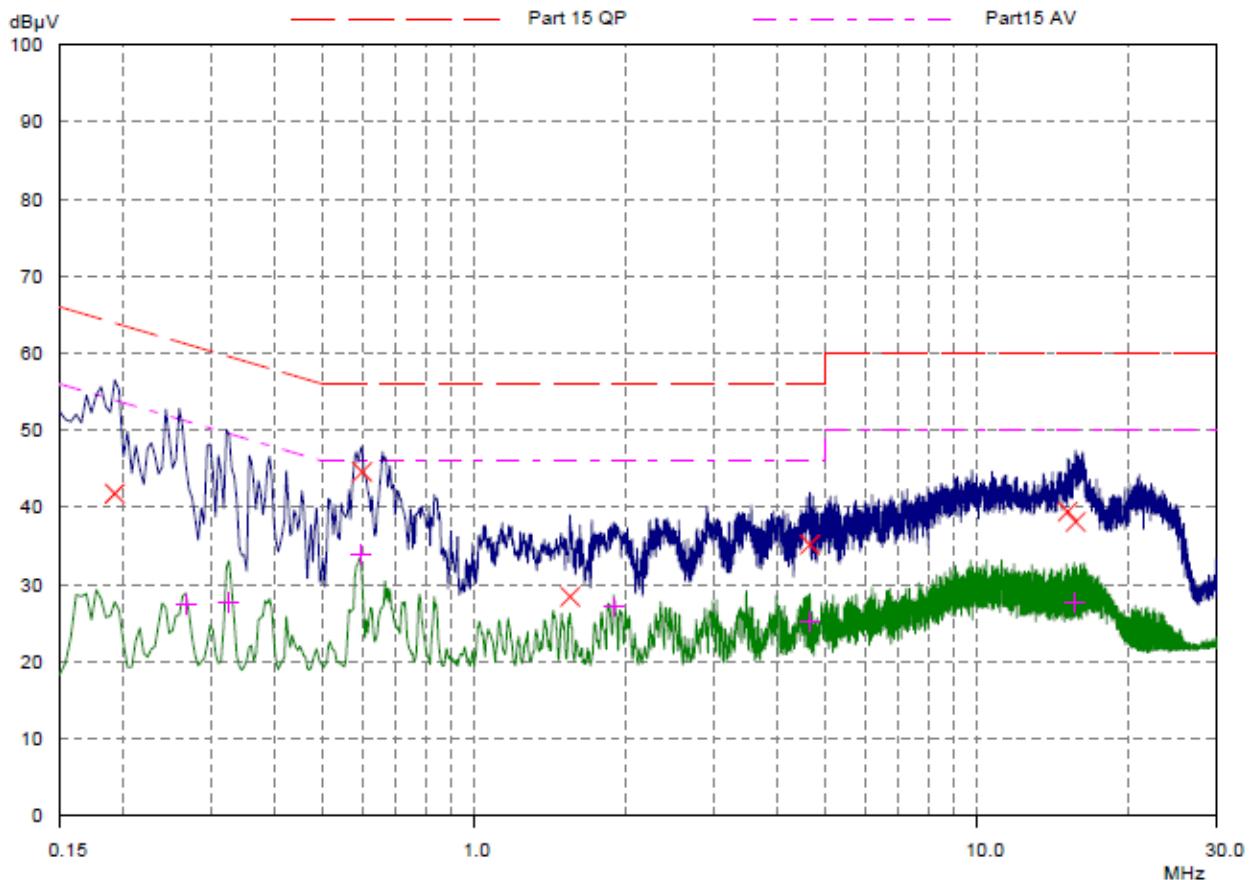
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Test Results:



Final Measurement Results

Frequency MHz	QP Level dB μ V	QP Limit dB μ V	QP Delta dB	Phase	PE
0.19296	41.78	63.91	22.13	L1	gnd
0.59921	44.59	56.00	11.41	L1	gnd
1.55234	28.40	56.00	27.60	L1	gnd
4.66171	35.17	56.00	20.83	L1	gnd
15.18515	39.43	60.00	20.57	L1	gnd
15.73984	38.11	60.00	21.89	L1	gnd

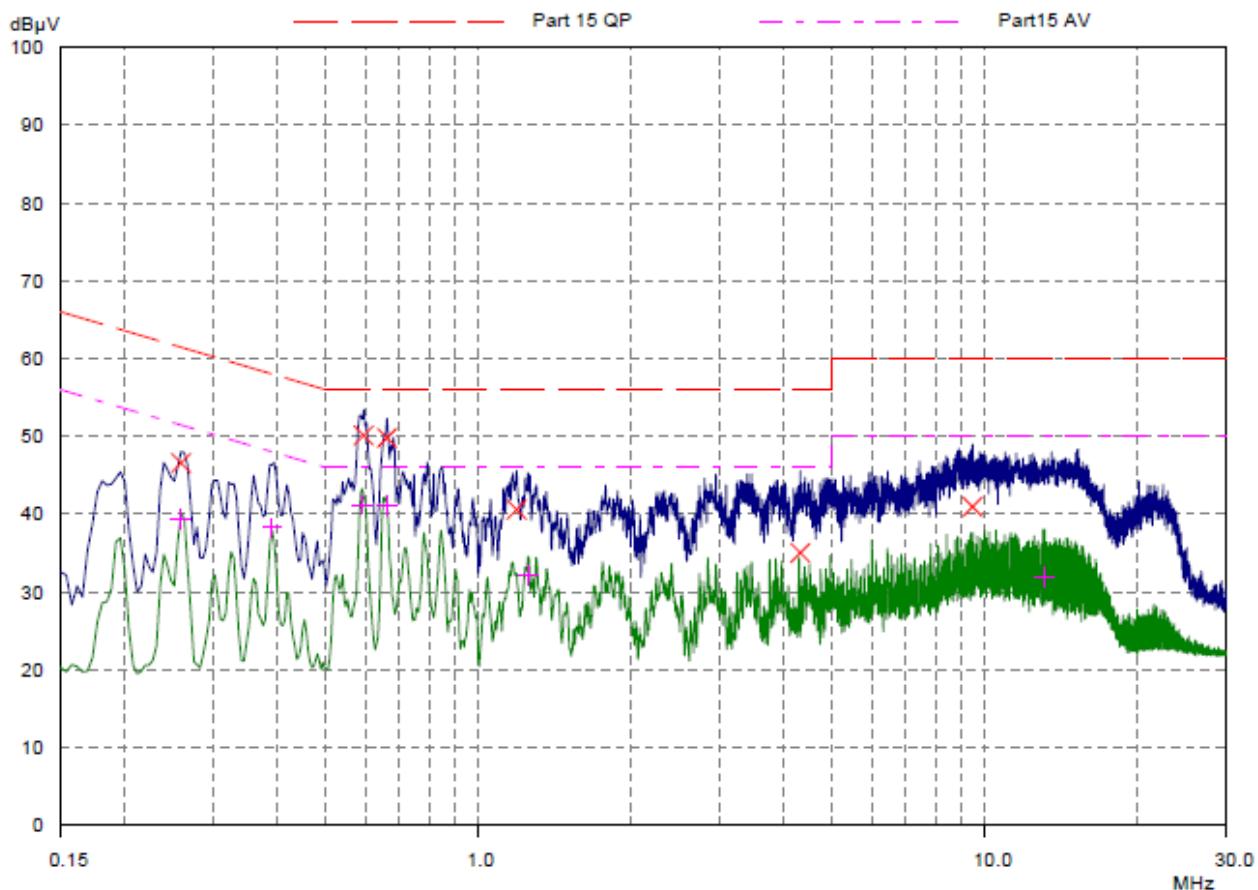
Frequency MHz	AV Level dB μ V	AV Limit dB μ V	AV Delta dB	Phase	PE
0.26718	27.42	51.21	23.79	L1	gnd
0.32578	27.74	49.56	21.82	L1	gnd
0.59531	33.96	46.00	12.04	L1	gnd
1.89609	27.05	46.00	18.95	L1	gnd
4.65781	25.25	46.00	20.75	L1	gnd
15.61875	27.76	50.00	22.24	L1	gnd

L Line

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Final Measurement Results

Frequency MHz	QP Level dB μ V	QP Limit dB μ V	QP Delta dB	Phase	PE
0.25937	46.55	61.45	14.90	N	gnd
0.59531	50.11	56.00	5.89	N	gnd
0.66171	49.81	56.00	6.19	N	gnd
1.19296	40.57	56.00	15.43	N	gnd
4.33359	35.01	56.00	20.99	N	gnd
9.48203	40.93	60.00	19.07	N	gnd

Frequency MHz	AV Level dB μ V	AV Limit dB μ V	AV Delta dB	Phase	PE
0.25937	39.26	51.45	12.19	N	gnd
0.39218	38.23	48.02	9.79	N	gnd
0.5914	41.21	46.00	4.79	N	gnd
0.66171	41.02	46.00	4.98	N	gnd
1.25546	32.09	46.00	13.91	N	gnd
13.15781	31.91	50.00	18.09	N	gnd

N Line
Conducted Emission from 150 KHz to 30 MHz

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3. Main Test Instruments

No.	Name	Type	Manufacturer	Serial Number	Calibration Date	Expiration Time	Valid Period
01	Loop Antenna	FMZB1519	SCHWARZBECK	1519-047	2014-02-29	2017-02-28	3 years
02	EMI Test Receiver	ESCS30	R&S	100138	2014-12-17	2015-12-16	1 year
03	LISN	ENV216	R&S	101171	2014-12-17	2015-12-16	1 year
04	EMI Test Receiver	ESCI	R&S	100948	2015-04-26	2016-05-25	1 year
05	TRILOG Broadband Antenna	VULB 9163	Schwarzbeck	9163-201	2013-11-25	2016-11-24	3 years
06	Double Ridged Waveguide Horn Antenna	HF907	R&S	100126	2012-07-02	2015-07-01	3 years
07	Spectrum Analyzer	E4445A	Agilent	MY46181146	2015-04-26	2016-05-25	1 year
08	MOB COMMS DC SUPPLY	66319D	Agilent	MY43004105	2015-04-26	2016-05-25	1 year
09	Spectrum Analyzer	FSV30	R&S	100815	2014-12-18	2015-12-17	1 year
10	Standard Gain Horn	3160-09	ETS-Lindgren	00102644	2014-05-20	2017-05-19	3 years
11	RF Cable	SMA 15cm	Agilent	0001	2015-06-07	2015-08-06	2 months

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ANNEX A: EUT Appearance and Test Setup

A.1 EUT Appearance



Picture 1-1: EUT

Picture 1 EUT

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A.2 Test Setup



Picture 2 Radiated Emission Test Setup

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Picture 3 Conducted Emission Test Setup