

RF TEST REPORT

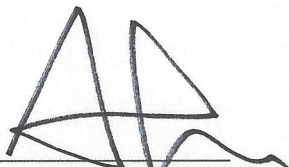
Test report No.: EMC- FCC- R0136
FCC ID: A3LSMTI5343
Type of equipment: Internet Phone
Basic Model: SMT-i5343
Applicant: Samsung Electronics Co.,Ltd.
FCC Rule Part(s): FCC Part 15 Subpart C 15.225
Frequency Range: 13.560 4 MHz
Test result: Complied

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.
The results of testing in this report apply to the product/system which was tested only.
Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of test: January 13, 2014 ~ January 17 , 2014

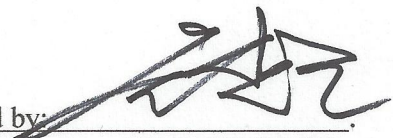
Issued date: January 20 , 2014

Tested by:



AHN, BYUNG WOO

Approved by:



YU, SANG HOON

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1. Client information

Applicant : Samsung Electronics Co.,Ltd.
Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea 443-742
Telephone number : +82-31-279-4257
Facsimile number : +82-31-279-2296
Contact person : Lim jong hun/ zihun@samsung.com

Manufacturer: Samsung Electronics Co.,Ltd.
Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea 443-742

2. Laboratory information

Address

EMC Compliance Ltd.
480-5 Shin-dong, Yeongtong-gu, Suwon-city, Gyunggi-do, 443-390, Korea
Telephone Number: 82 31 336 9919 Facsimile Number: 82 31 336 4767

Certificate

CBTL Testing Laboratory, KOLAS NO.: 231
FCC Filing No.: 793334
VCCI Registration No.: C-1713, R-1606, T-258

SITE MAP



3. Description of E.U.T.

3.1 Basic description

Applicant :	Samsung Electronics Co.,Ltd.
Address of Applicant:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea 443-742
Manufacturer:	Samsung Electronics Co.,Ltd.
Address of Manufacturer:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea 443-742
Type of equipment:	Internet Phone
Basic Model:	SMT-i5343
Serial number:	Engineering Sample

3.2 General description

Frequency	13.560 4 MHz
Type of Modulation	ASK
Number of Channels	1 channel
Type of Antenna	Integral (PCB antenna)
Power supply	DC 12 V , POE
Operating temperature	0 °C ~ 45 °C
Dimension	223.4 (W) × 223.4 (L) × 113 (D) mm
Weight	1.25Kg

3.3 Test frequency

frequency	13.560 4 MHz
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4. Summary of test results

4.1 Standards & results

Rule Reference	Parameter	Status
15.225 (a)	In-band Emission	C
15.225 (b)	In-band Emission	C
15.225 (c)	In-band Emission	C
15.225 (d) 15.209	Out-of -band Emission	C
15.225 (e)	Frequency Stability Tolerance	C
15.207	Conducted Emissions	C
Note: C=complies NC= Not complies NT=Not tested NA=Not Applicable		

4.2 Uncertainty

Measurement Item	Combined Standard Uncertainty U _c	Expanded Uncertainty U = KU _c (K = 2)
Conducted RF power	± 0.272 dB	± 0.544 dB
Radiated disturbance	± 1.943 dB	± 3.886 dB
Conducted disturbance	± 1.265 dB	± 2.53 dB

5. Test results

5.1 In-band Emission (15.225 (a))

5.1.1 Minimum Standard

15.225 (a) The field strength of any emission within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

5.1.2 Measurement Procedure

Test Procedure The Radiated Electric Field Strength intensity has been measured on semi anechoic chamber with a ground plane and at a distance of 3m.

Frequency : From 9kHz to 30MHz at distance 3m The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

Frequency : From 30MHz to 1GHz at distance 3m The measuring antenna height varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.

Measurements were performed with a QP, PK, and AV detector. The radiated emission measurements were made with the following detector function of the test receiver (below 1GHz).

Freq'	9-90kHz	90-110kHz	150-490kHz	490kHz-30MHz	30MHz-1GHz
Detector type	PK/AV	QP	PK/AV	QP	QP
IF bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz

* Part 15 Section 15.31 (f)(2) (9kHz-30MHz)

[Limit at 3m]=[Limit at 300m]-40 x log(3[m]/300[m])

[Limit at 3m]=[Limit at 30m]-40 x log (3[m]/30[m])

5.1.3 Test Result

- Complies

EUT	Internet Phone		
Operating Frequency	13.560 4 MHz	Model Name	SMT-i5343
Operating Mode	Transmitter Mode	Modulation Technology	ASK
Environmental Condition	21 °C/46%	Test Channel	1ch

Frequency	Reading (dBuV)	Correction Factor	field strength dB μ V/m at 3 m
13.560 4 MHz	78.9	-11.5	67.4
Maximum Level(dBμA/m)			15.9
Limit(dBuV/m) at 3m			124 dBuV/m
margin			56.6
Uncertainty			± 3.8 dB

Note: Field strength limit was calculated with 40dB/dec

5.2 In-band Emission (15.225 (b)(c))

5.2.1 Regulation

15.225 (b) With in the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

15.225 (c) With in the bands 13.110-13.410 MHz and 13.710-14.010 MHz, the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

5.2.2 Test Result

- Complied

DC 12V

Measurement Distance: 3m

Frequency [MHz]	Receiver Bandwidth [kHz]	Reading [dB(μV)]	Pol. [V/H]	Factor [dB]	Limit [dB(μV/m)]	Result [dB(μV/m)]	Margin [dB]
QP DATA							
13.505	9	45.5	H	-11.5	80.51	34.0	56.5
13.625	9	40.9	V	-11.4	80.51	29.5	61.0
13.385	9	44.6	V	-11.5	90.47	33.1	47.4
13.745	9	40.1	H	-11.4	90.47	28.7	51.8

POE

Measurement Distance: 3m

Frequency [MHz]	Receiver Bandwidth [kHz]	Reading [dB(μV)]	Pol. [V/H]	Factor [dB]	Limit [dB(μV/m)]	Result [dB(μV/m)]	Margin [dB]
QP DATA							
13.505	9	40.7	H	-11.5	80.51	29.2	61.3
13.625	9	40.9	H	-11.4	80.51	29.5	61.0
13.385	9	44.4	H	-11.5	90.47	32.9	47.6
13.745	9	40.3	V	-11.4	90.47	28.9	51.6

Margin (dB) = Limit – Actual

[Result] = Reading – Amp Gain + Attenuator + AF + CL

1. H = Horizontal, V = Vertical Polarization

2. ATT = Attenuation (10dB pad and/or Insertion Loss of HPF), AF/CL = Antenna Factor and Cable Loss

* The spurious emission at the frequency does not fall in the restricted bands.

** The measured result is within the test standard limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95 % level of confidence. However, the result indicates that compliance is more probable than non-compliance.

NOTE: All emissions not reported were more than 20 dB below the specified limit or in the noise floor.

5.3 Out-of-band Emission (15.225 (d),15.209)

5.3.1 Regulation

15.225 (d) The Field Strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in 15.209

Frequency (MHz)	Field Strength (uV/m)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30(29.54dBuV/m)	30
30.0-88.0	100(40 dBuV/m)	3
88-216	150(43.5 dBuV/m)	3
216-960	200 (46 dBuV/m)	3
Above 960	500 (53.98 dBuV/m)	

5.3.2 Measurement Procedure

The spurious emissions from the EuT will be measured on an open area test site in the frequency range of 9 kHz to 30 MHz using a tuned receiver and a shielded loop antenna.

The antenna was positioned 3, 10 or 30 meters horizontally from the EuT.

Measurements have been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions.

In the case where larger measuring distances are required the results will extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2].

The final measurement will be performed with an EMI Receiver set to Quasi Peak detector except for the frequency bands 9 kHz to 90 kHz and 110 to 490 kHz where an average detector will be used according to Section 15.209 (d) [2].

The final level, expressed in dBμV/m, is arrived at by taking the reading from the EMI receiver (Level dBμV) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has to be compared with the relevant FCC limit. The resolution bandwidth during the measurement is as follows:

9 kHz – 150 kHz: ResBW: 200 Hz

150 kHz – 30 MHz: ResBW: 9 kHz

5.3.3 Test Result -Complied

Measurement Distance: 3m

-Above 30MHz

DC 12V

Frequency [MHz]	Receiver Bandwidth [kHz]	Reading [dB(μV)]	Pol. [V/H]	Factor [dB]	Limit [dB(μV/m)]	Result [dB(μV/m)]	Margin [dB]
QP DATA.							
31.940	120	55.4	V	-17.0	54.0	38.4	15.6
37.760	120	46.7	V	-15.3	40.0	31.4	8.6
119.240	120	46.7	V	-16.6	43.5	30.1	13.4
136.700	120	50.7	V	-18.7	43.5	32.0	11.5
328.760	120	47.3	H	-11.2	46.0	36.1	9.9
433.520	120	42.6	H	-8.7	54.0	33.9	20.1

POE

Frequency [MHz]	Receiver Bandwidth [kHz]	Reading [dB(μV)]	Pol. [V/H]	Factor [dB]	Limit [dB(μV/m)]	Result [dB(μV/m)]	Margin [dB]
QP DATA.							
37.760	120	44.9	V	-15.3	40.0	29.6	10.4
55.220	120	44.4	V	-13.8	54.0	30.6	23.4
200.720	120	48.7	H	-15.0	54.0	33.7	20.3
249.220	120	44.8	V	-13.5	46.0	31.3	14.7
322.940	120	45.0	H	-11.4	46.0	33.6	12.4

Margin (dB) = Limit – Actual

[Result = Reading – Amp Gain + Attenuator + AF + CL]

1. H = Horizontal, V = Vertical Polarization

2. ATT = Attenuation (10dB pad and/or Insertion Loss of HPF), AF/CL = Antenna Factor and Cable Loss

* The spurious emission at the frequency does not fall in the restricted bands.

** The measured result is within the test standard limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95 % level of confidence. However, the result indicates that compliance is more probable than non-compliance.

NOTE: All emissions not reported were more than 20 dB below the specified limit or in the noise floor.

5.4 Frequency tolerance (15.225 (e))

5.4.1 Regulation

15.225 (e) 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.

5.4.2 Test Result

- Complied

DC 12V

VOLTAGE (%)	POWER (V)	TEMP (°C)	FREQ (Hz)	FREQ.DEV (Hz)	Deviation (%)
100	12	20	13560414	-14	-0.00010
		-20	13560438	-38	-0.00028
		-10	13560476	-76	-0.00056
		0	13560460	-60	-0.00044
		10	13560371	29	0.00021
		20	13560423	-23	-0.00017
		25	13560371	29	0.00021
		30	13560360	40	0.00029
		40	13560342	58	0.00043
		50	13560364	36	0.00027
85	10.2	20	13560375	25	0.00018
115	13.8	20	13560414	-14	-0.00010

POE

VOLTAGE (%)	POWER (V)	TEMP (°C)	FREQ (Hz)	FREQ.DEV (Hz)	Deviation (%)
100	220	20	13560423	-23	-0.00017
		-20	13560442	-42	-0.00031
		-10	13560469	-69	-0.00051
		0	13560453	-53	-0.00039
		10	13560381	19	0.00014
		20	13560385	15	0.00011
		25	13560353	47	0.00035
		30	13560362	38	0.00028
		40	13560374	26	0.00019
		50	13560345	55	0.00041
85	198	20	13560366	34	0.00025
115	242	20	13560423	-23	-0.00017

5.5 Conducted Emission

5.5.1 Regulation

According to §15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (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

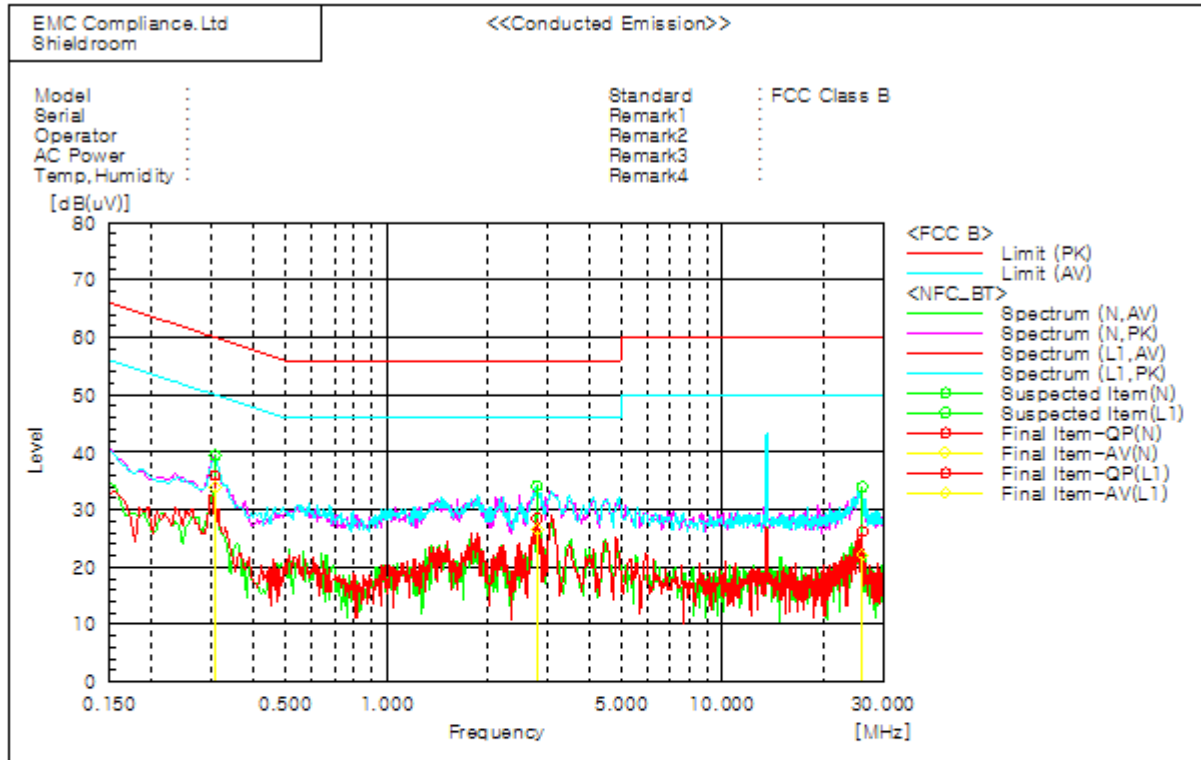
* Decreases with the logarithm of the frequency.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

5.5.2 Measurement Procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50 Ω /50 μ H LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 kHz or to QUASI-PEAK and AVERAGE within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

DC 12V(Worst Case)



Final Result

— N Phase —

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	2,80182	18,7	16,8	9,7	28,4	26,5	56,0	46,0	27,6	19,5

— L1 Phase —

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	0,30884	26,0	23,9	9,9	35,9	33,8	60,0	50,0	24,1	16,2
2	26,06234	16,2	12,0	10,0	26,2	22,0	60,0	50,0	33,8	28,0

6. Test equipment used for test

	Description	Manufacture	Model No.	Serial No.	Next Cal Date.
■	Test Receiver	R&S	ESCI7	100732	14.02.18
■	Spectrum Analyzer	R&S	FSP40	100209	14.10.21
■	Loop Antenna	R&S	HFH2-Z2	100355	15.06.19
■	Bi-Log Antenna	Schwarzbeck	VULB9163	552	14.07.18
■	Attenuator	HP	8491A	16861	14.07.08
■	Antenna Mast	Innco Systems	MA4000-EP	303	-
■	Turn Table	Innco Systems	DT2000S-1t	79	-
■	DC Power Supply	Agilent	E3632A	MY40004399	14.01.08
■	Signal Generator	R&S	SMR40	100007	14.06.11
■	Amplifier	Agilent	8449B	3008A02343	14.10.31