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FCC ANT+ REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:
May 31, 2018
Test Site/Location:
HCT CO., LTD., 74,Seoicheon-ro 578beon-gil,Majang-myeo,Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
Report No.: HCT-RF-1805-FC034-R1

FCC ID:	**A3LSMG885S**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

According to the Evaluation report, all of the data contained herein is reused from the reference FCC ID : A3LSMG885F report.

Model(s):	SM-G885S
EUT Type:	Mobile Phone
Max. RF Output Power:	85.74 dBuV/m @3 m
Frequency Range:	2402 MHz -2480 MHz
Modulation type	GFSK
FCC Classification:	Low Power communication Device Transmitter(DXX)
FCC Rule Part(s):	Part 15.249

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Report prepared by : Jung Ki Lim
Engineer of Telecommunication testing center

Approved by : Kwon Jeong
Manager of Telecommunication testing center

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1805-FC034	May 24, 2018	- First Approval Report
HCT-RF-1805-FC034-R1	May 31, 2018	- Retested the D.C.C.F

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1. GENERAL INFORMATION

Applicant:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMG885S
EUT Type:	Mobile Phone
Model:	SM-G885S
Date(s) of Tests:	April 02, 2018 ~ April 19, 2018 & May 31, 2018 (Only the Duty Cycle test was performed)
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

2. EUT DESCRIPTION

Model	SM-G885S	
EUT Type	Mobile Phone	
Power Supply	DC 3.85 V	
Battery Information	Model: EB-BG885ABU Type: Li-ion Battery	
Travel Adapter Information	Model: EP-TA20EWE Input: 100 - 240V Output: 9.0V, 1.66A or 5.0V, 2.0A Manufacture: SAMSUNG	
Frequency Range	TX: 2402 MHz ~ 2480 MHz RX: 2402 MHz ~ 2480 MHz	
Fundamental Field Strength Level	Peak	85.74 dBuV/m @3 m
	Average	61.37 dBuV/m @3 m
Operating Mode	ANT+	
Modulation Type	GFSK	
Number of Channels	79 Channels	
Antenna Specification	Antenna type: METAL + TFA Peak Gain : -2.12 dBi	

3. TEST METHODOLOGY

The measurement procedure described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) Operating Under §15.249" were used in the measurement.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.249 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3.75 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 8 of ANSI C63.10. (Version: 2013)

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low, mid and high with Lowest data rate(worst case) is chosen for full testing.

3.5 WORSTCASE OF TEST MODES

All modes of operation were investigated and the worst case configuration results are reported.

[RADIATED EMISSIONS]

- Mode : Stand alone, Stand alone+ external accessories(earphone, etc)
- Worstcase : Stand alone

[POWERLINE CONDUCTED EMISSION]

- Mode : Stand alone+Earphone+Travel Adapter, Stand alone+Travel Adapter
- Worstcase : Stand alone+Travel Adapter

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.
Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 07, 2015 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

* The antennas of this E.U.T are permanently attached.

*The E.U.T Complies with the requirement of §15.203

7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of *k* = 2 to indicate a 95 % level of confidence.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.71

8. SUMMARY TEST OF RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
Occupied Bandwidth	§2.1049	N/A	CONDUCTED	PASS
Duty Cycle	§15.35(c)	N/A		N/A
AC Power line Conducted Emissions	§15.207	cf. Section 9.4		PASS
Fundamental Field Strength Level	§15.249(a)(e)	< 50 mV/m	RADIATED	PASS
Harmonic Field Strength Level	§15.249(a)(e)	< 500 mV/m		PASS
General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	§15.205, 15.209, 15.249(d)(e)	< 15.209 limits or 50dB below the level of the fundamental		PASS

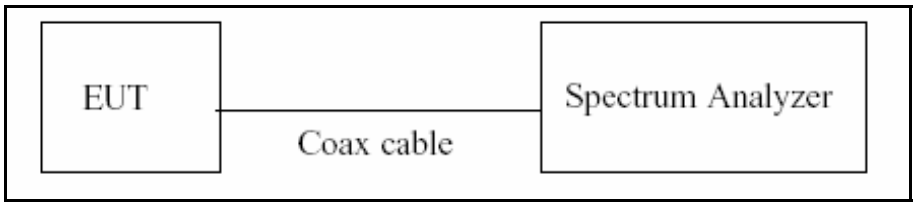
9. TEST RESULT

9.1 DUTY CYCLE

Test Requirements §15.35(c)

(c) Unless otherwise specified, e.g. § 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification

▣ TEST CONFIGURATION



▣ TEST RESULTS

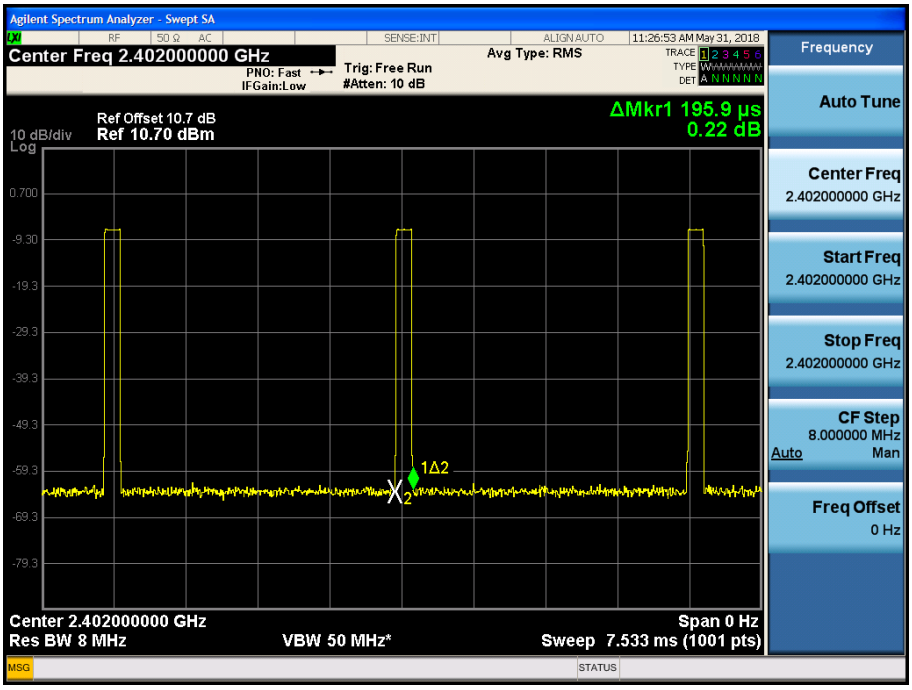
DCCF = 20*$\log_{10}$(Pulse width / Period of the pulse train)

= 20*$\log_{10}$(31 x 0.195 ms / 100 ms) = -24.37 dB

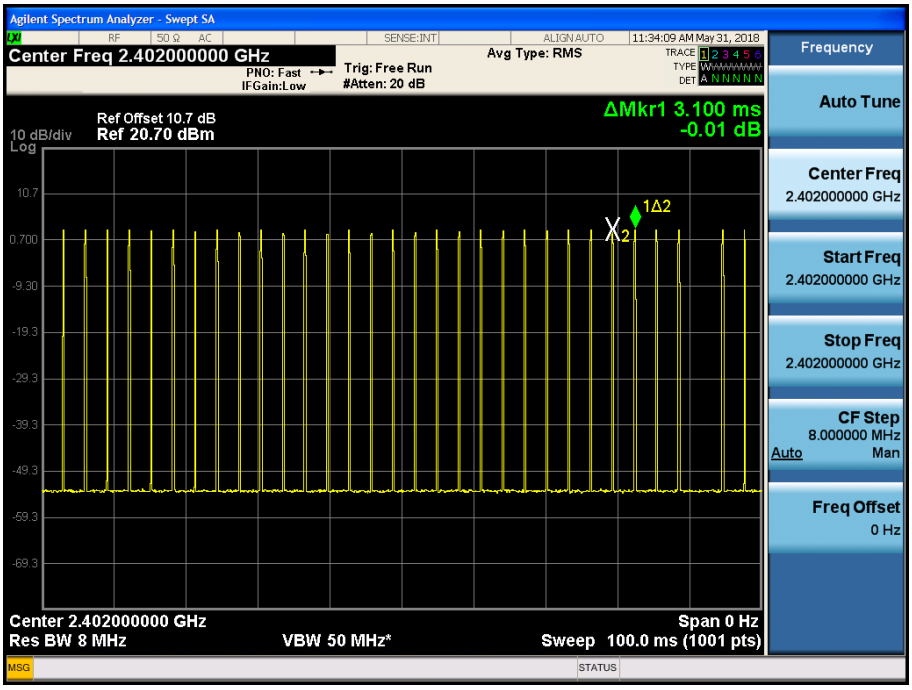
DCCF
-24.37 dB

▣ TEST RESULTS PLOTS

Pulse Width plot



Period of the Pulse Train

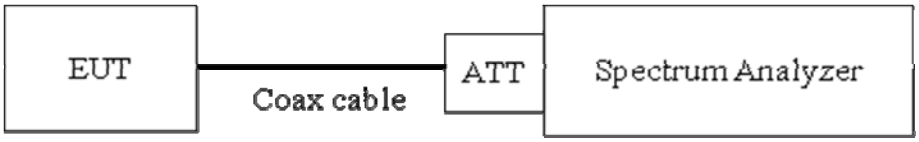


9.2 OCCUPIED BANDWIDTH MEASUREMENT

Test Requirements and limit, §2.1049

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer.

RBW = 1% to 3% of the 99% bandwidth.

VBW ≥ 3 x RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

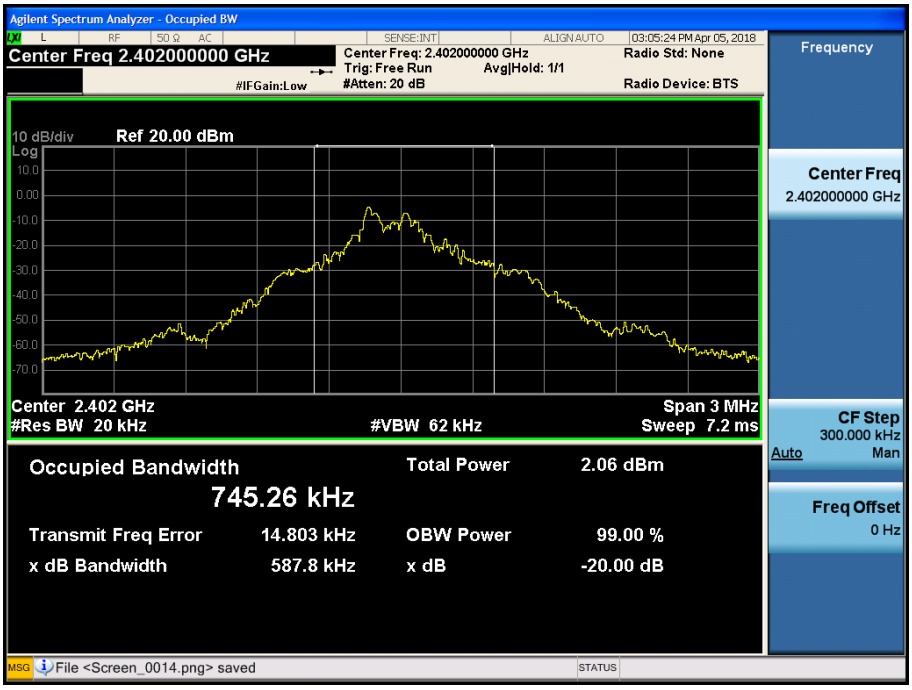
Note : We tested Occupied Bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.

▣ TEST RESULTS

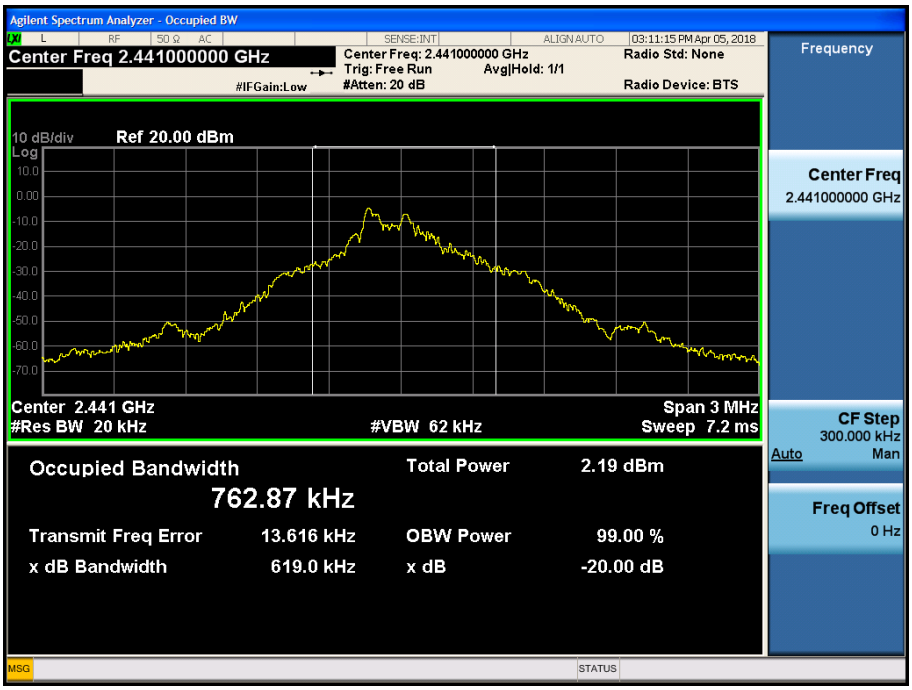
ANT+ Mode	99% Bandwidth
Frequency[MHz]	(kHz)
2402	745.26
2441	762.87
2480	759.64

▣ RESULT PLOTS

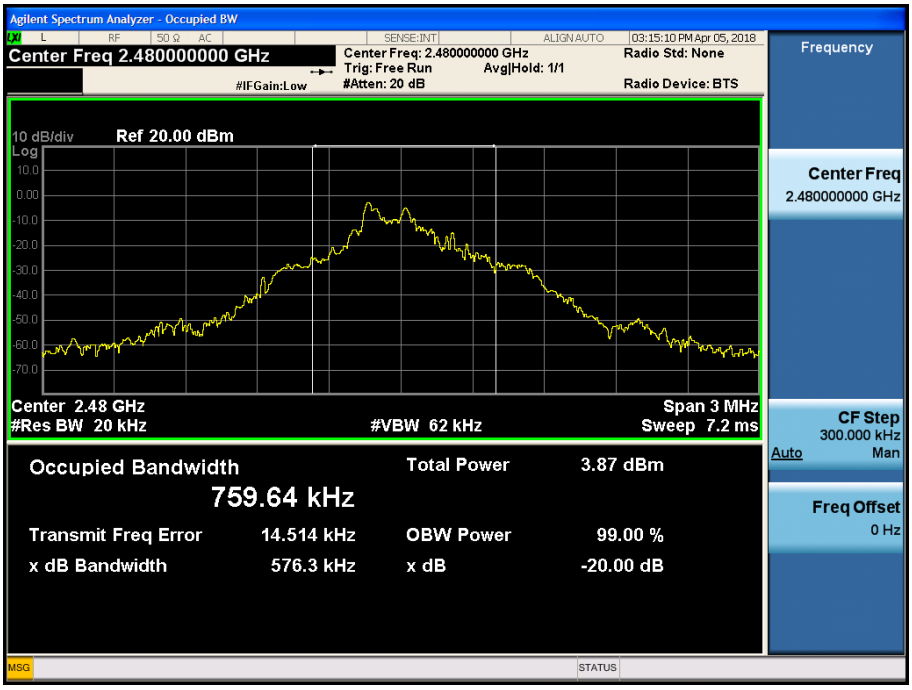
Occupied Bandwidth plot (Low)



Occupied Bandwidth plot (Mid)



Occupied Bandwidth plot (High)



9.3 RADIATED MEASUREMENT.

9.3.1 FUNDAMENTAL FIELD STRENGTH LEVEL MEASUREMENT

Test Requirements and limit, §15.249(a)(e)

Operation within the bands 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHZ, and 24.0–24.25 GHz.

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(c) Field strength limits are specified at a distance of 3 meters.

(e) As shown in § 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

The maximum permissible average field strength level is 50 mV/m (93.98 dBuV/m).
The maximum permissible peak field strength level is 500 mV/m (113.98 dBuV/m).

TEST PROCEDURE

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. Spectrum Setting
   a. Peak: 1 GHz – 25 GHz, RBW = 1 MHz, VBW ≥3*RBW
8. Average value of pulsed emissions

Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission and pulsed operation is employed, the average measurement shall be determined from the peak field strength after correcting for the worst-case duty cycle as described in section 9.1.

▣ TEST RESULTS

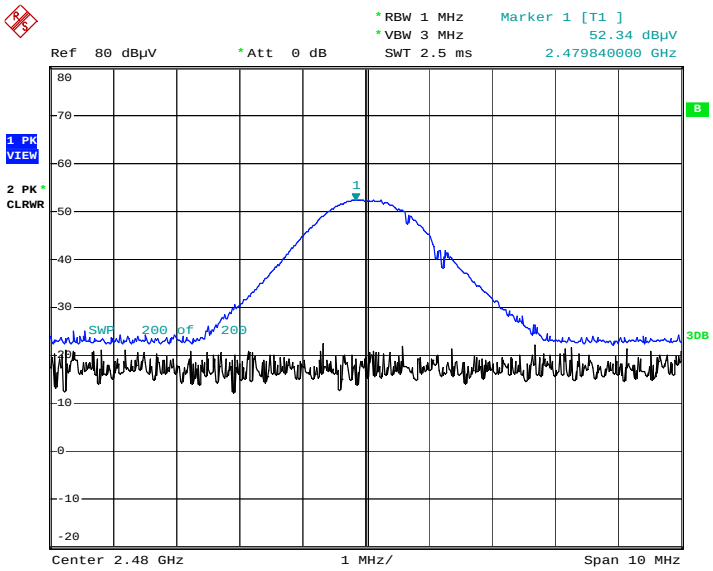
Frequency [MHz]	Reading [dBuV/m]	A.F.+C.L. +D.F. [dB]	Ant. Pol. [H/V]	D.C.C.F [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2402	48.24	33.33	V	0.00	81.57	113.98	32.41	PK
2402	48.24	33.33	V	-24.37	57.20	93.98	36.78	AV
2402	48.88	33.33	H	0.00	82.21	113.98	31.77	PK
2402	48.88	33.33	H	-24.37	57.84	93.98	36.14	AV
2441	49.18	33.40	V	0.00	82.58	113.98	31.40	PK
2441	49.18	33.40	V	-24.37	58.21	93.98	35.77	AV
2441	49.74	33.40	H	0.00	83.14	113.98	30.84	PK
2441	49.74	33.40	H	-24.37	58.77	93.98	35.21	AV
2480	51.96	33.40	V	0.00	85.36	113.98	28.62	PK
2480	51.96	33.40	V	-24.37	60.99	93.98	32.99	AV
2480	52.34	33.40	H	0.00	85.74	113.98	28.24	PK
2480	52.34	33.40	H	-24.37	61.37	93.98	32.61	AV

Note :

1. Average field strength data is determined by applying the duty cycle correction factor(DCCF) found in Section 9.1 to the measured peak field strength values.
2. Peak: Total = Reading Value + Antenna Factor + Cable Loss + Distance Factor
   Average: Total = Reading Value + Antenna Factor + Cable Loss + Distance Factor
   + Duty Cycle Correction Factor
3. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. Measurement distance : 3.75 m

▣ RESULT PLOTS (Worst case : X-H)

Fundamental Field Strength plot (Ch.78)



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Note : Only the worst case plots for Fundamental Field Strength

9.3.2 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209, §15.249(d)(e)

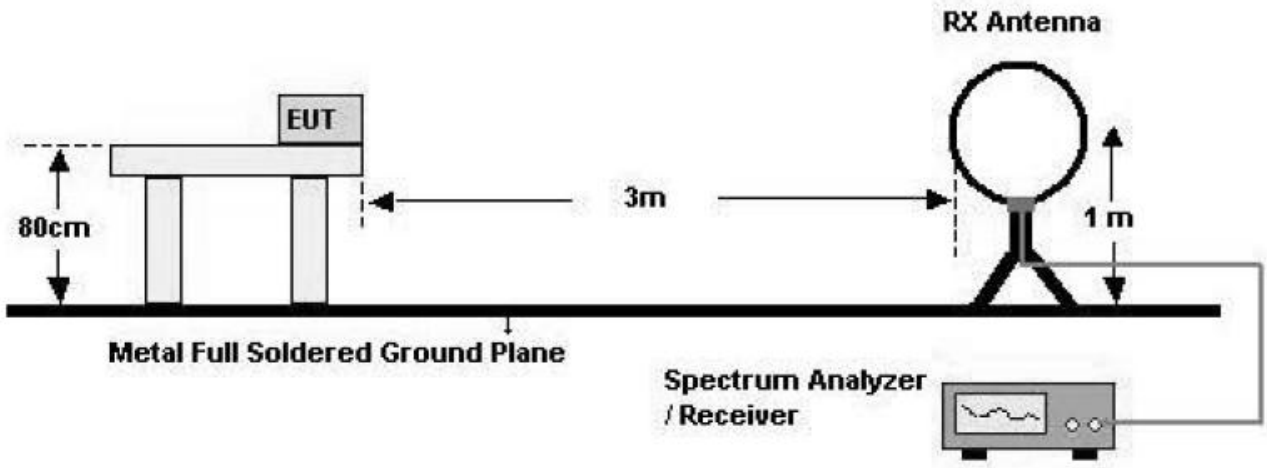
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

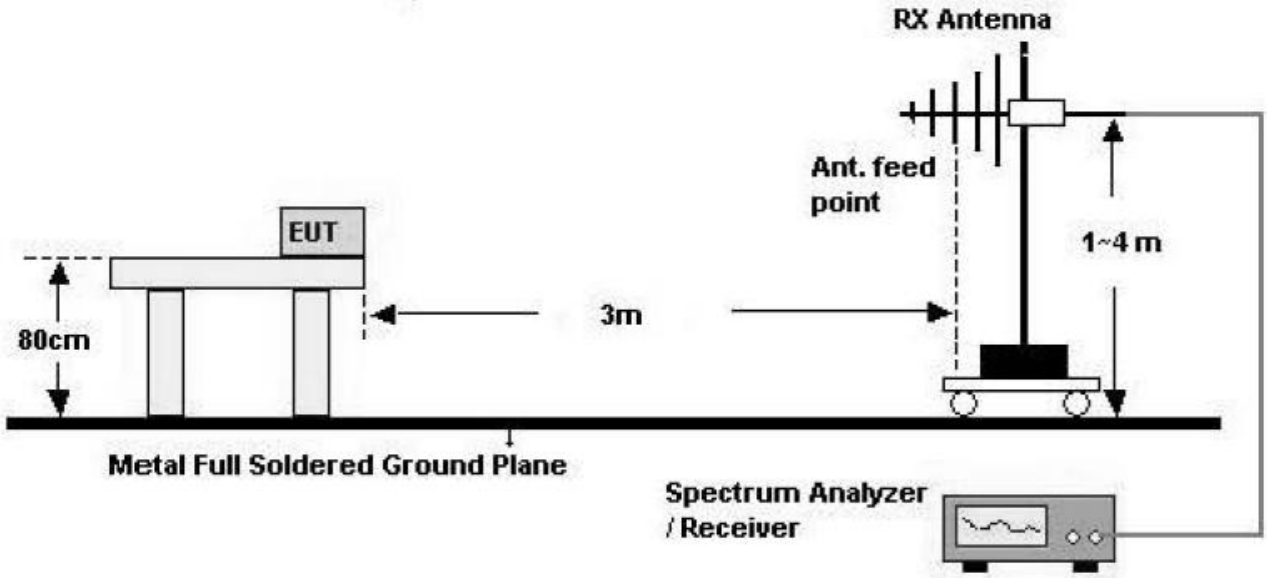
(e) As shown in § 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

Test Configuration

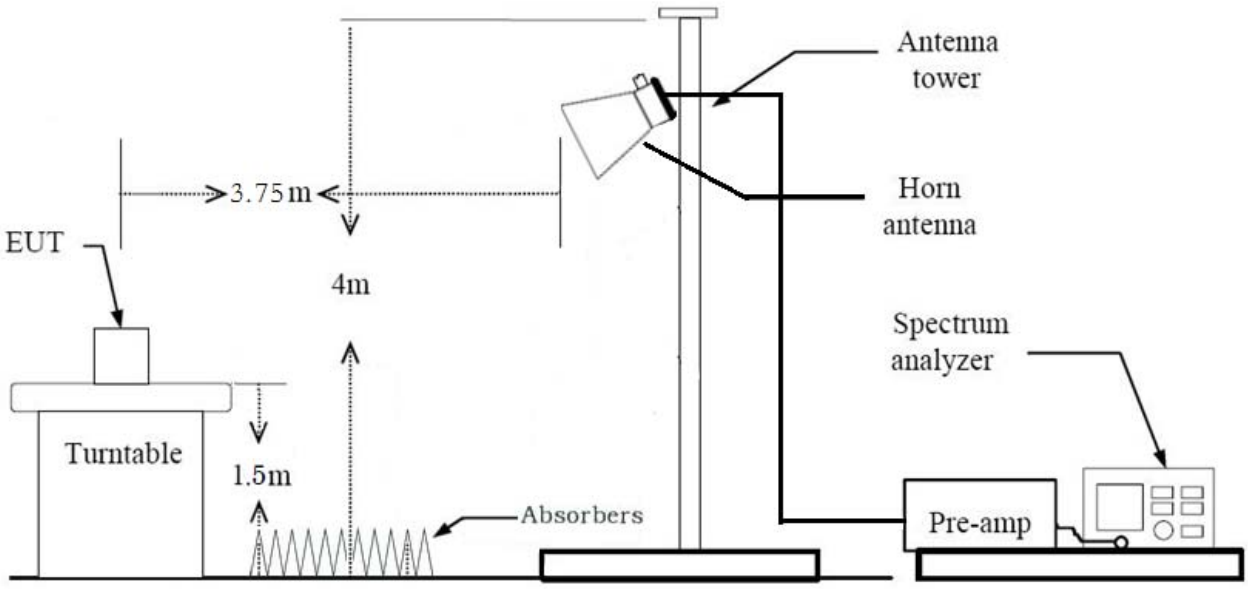
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. Spectrum Setting
   a. Peak Setting 1 GHz – 25 GHz, RBW = 1 MHz, VBW = 3 MHz.
   b. Average Setting 1 GHz – 25 GHz, RBW = 1 MHz, VBW ≥ 1/τ Hz, where τ = pulse width in seconds.
8. Average value of pulsed emissions
   Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission and pulsed operation is employed, the average measurement shall be determined from the peak field strength after correcting for the worst-case duty cycle as described in section 9.1.
9. Marker-delta method (Section 6.10.6 in ANSI C63.10: 2013)
   The following procedure shall be used for the marker-delta method:

a) Perform an in-band field strength measurement of the fundamental emission using the RBW and detector function required for the frequency being measured. For example, for a device operating in the 902 MHz to 928 MHz band, use a 120 kHz RBW with a CISPR QP detector (a peak detector with 100 kHz RBW alternatively may be used). For transmitters operating above 1 GHz, use a 1 MHz RBW, a 3 MHz VBW, and a peak detector, as required. Repeat the measurement with an average detector (or alternatively, a peak detector and reduced VBW). For pulsed emissions, other factors shall be included; see 4.1.4.2.6.

b) Choose an EMI receiver or spectrum analyzer span that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set the instrument RBW to 1% of the total span (but never less than 30 kHz), with a VBW equal to or greater than three times the RBW. Record the peak levels of the fundamental emission and the relevant band-edge emission(i.e., run several sweeps in peak hold mode). Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not an absolute field strength measurement; it is only a relative measurement to determine the amount by which the emission drops at the band edge relative to the highest fundamental emission level.

c) Subtract the delta measured in step b) from the field strengths measured in step a). The resulting field strengths (CISPR QP, average, or peak, as appropriate) are then used to determine band-edge emissions compliance, where required.

Note :

1. We used the standard radiated method for RSE and used the average value of pulsed emission and delta marker method for band edge.
2. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
3. Below VBW is for RSE test

ANT+ Mode	T_{Total} (ms)	VBW(1/T) (Hz)	The actual setting value of VBW (Hz)
	3.10	322.58	10000

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
4. Limit line = specific Limits (dBuV) + Distance extrapolation factor
5. This test is performed with hopping off.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. The test results for below 30 MHz is correlated to an open site.
   The result on OATS is about 2 dB higher than semi-anechoic chamber(10 m chamber)

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. This test is performed with hopping off.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Above 1 GHz

Operation Frequency: 2402 MHz

Frequency [MHz]	Reading [dBuV]	※A.F.+C.L.-A.G.+D.F. [dB]	ANT. POL [H/V]	Duty Cycle Correction [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4804	51.55	0.62	V	0	52.17	73.98	21.81	PK
4804	51.55	0.62	V	-24.37	27.80	53.98	26.18	AV
7206	50.96	10.05	V	0	61.01	73.98	12.97	PK
7206	50.96	10.05	V	-24.37	36.64	53.98	17.34	AV
4804	51.83	0.62	H	0	52.45	73.98	21.53	PK
4804	51.83	0.62	H	-24.37	28.08	53.98	25.90	AV
7206	51.07	10.05	H	0	61.12	73.98	12.86	PK
7206	51.07	10.05	H	-24.37	36.75	53.98	17.23	AV

※ A·F: ANTENNA FACTOR
C·L: CABLE LOSS
AMP G: AMPLIFIER GAIN

Notes:

1. Average field strength data is determined by applying the duty cycle correction factor(DCCF)
2. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
4. Total = Reading Value + Antenna Factor + Cable Loss – Amplifier Gain + Distance Factor + D.C.C.F
5. Spectrum setting:
   - Peak Setting 1 GHz – 25 GHz, RBW = 1 MHz, VBW = 3 MHz.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Measurement distance : 3.75 m

Operation Frequency: 2441 MHz

Frequency [MHz]	Reading [dBuV]	※A.F.+C.L.-A.G.+D.F. [dB]	ANT. POL [H/V]	Duty Cycle Correction [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4882	51.08	1.61	V	0	52.69	73.98	21.29	PK
4882	51.08	1.61	V	-24.37	28.32	53.98	25.66	AV
7323	50.87	10.02	V	0	60.89	73.98	13.09	PK
7323	50.87	10.02	V	-24.37	36.52	53.98	17.46	AV
4882	50.79	1.61	H	0	52.40	73.98	21.58	PK
4882	50.79	1.61	H	-24.37	28.03	53.98	25.95	AV
7323	50.39	10.02	H	0	60.41	73.98	13.57	PK
7323	50.39	10.02	H	-24.37	36.04	53.98	17.94	AV

※ A·F: ANTENNA FACTOR
C·L: CABLE LOSS
AMP G: AMPLIFIER GAIN

Notes:

1. Average field strength data is determined by applying the duty cycle correction factor(DCCF)
2. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
4. Total = Reading Value + Antenna Factor + Cable Loss – Amplifier Gain + Distance Factor + D.C.C.F
5. Spectrum setting:
   - Peak Setting 1 GHz – 25 GHz, RBW = 1 MHz, VBW = 3 MHz.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Measurement distance : 3.75 m

Operation Frequency: 2480 MHz

Frequency [MHz]	Reading [dBuV]	※A.F.+C.L.-A.G.+D.F. [dB]	ANT. POL [H/V]	Duty Cycle Correction [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4960	51.22	1.69	V	0	52.91	73.98	21.07	PK
4960	51.22	1.69	V	-24.37	28.54	53.98	25.44	AV
7440	50.79	11.43	V	0	62.22	73.98	11.76	PK
7440	50.79	11.43	V	-24.37	37.85	53.98	16.13	AV
4960	51.13	1.69	H	0	52.82	73.98	21.16	PK
4960	51.13	1.69	H	-24.37	28.45	53.98	25.53	AV
7440	50.21	11.43	H	0	61.64	73.98	12.34	PK
7440	50.21	11.43	H	-24.37	37.27	53.98	16.71	AV

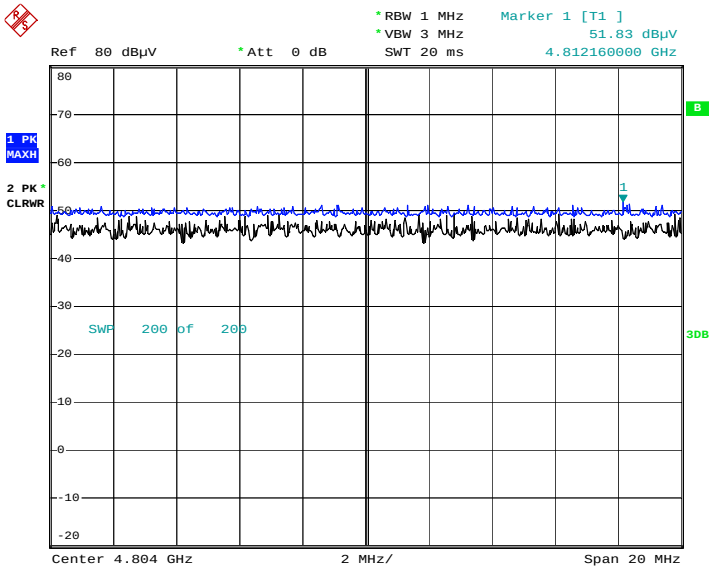
※ A·F: ANTENNA FACTOR
C·L: CABLE LOSS
AMP G: AMPLIFIER GAIN

Notes:

1. Average field strength data is determined by applying the duty cycle correction factor(DCCF)
2. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
4. Total = Reading Value + Antenna Factor + Cable Loss – Amplifier Gain + Distance Factor + D.C.C.F
5. Spectrum setting:
   - Peak Setting 1 GHz – 25 GHz, RBW = 1 MHz, VBW = 3 MHz.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Measurement distance : 3.75 m

▣ RESULT PLOTS (Worst case : X-H)

Radiated Spurious Emissions plot – Peak Reading (Ch.0 2nd Harmonic)



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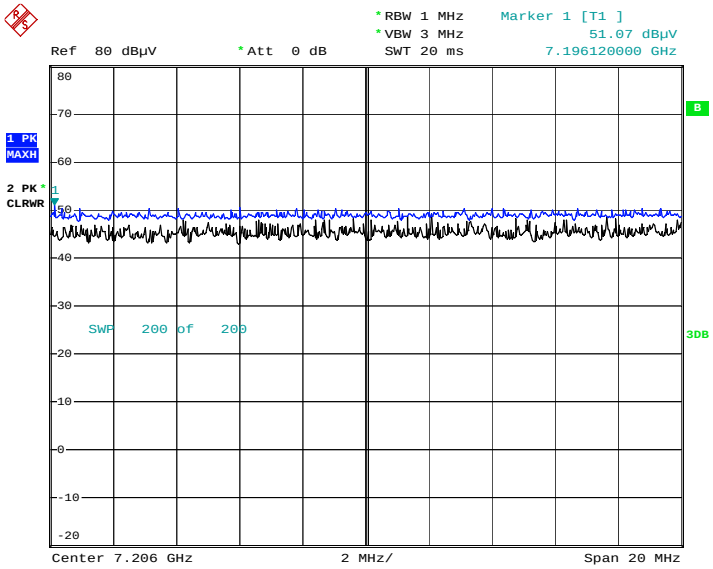
Radiated Spurious Emissions plot – Peak Reading (Ch.0 3rd Harmonic)



Note : Only the worst case plots for Radiated Spurious Emissions.

9.3.3 RADIATED BAND EDGES MEASUREMENTS

Test Requirements and limit, §15.205, §15.209, §15.249

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or tho the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Operation Mode ANT+

Operating Frequency 2402 MHz

Frequency [MHz]	Reading [dBuV/m]	A.F.+CL +D.F [dB]	Ant. Pol. [H/V]	D.C.C.F [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2400.0	27.06	35.36	H	0	62.42	73.98	11.56	PK
2400.0	27.06	35.36	H	-24.37	38.05	53.98	15.93	AV
2400.0	26.30	35.36	V	0	61.66	73.98	12.32	PK
2400.0	26.30	35.36	V	-24.37	37.29	53.98	16.69	AV

※ A·F: ANTENNA FACTOR
C·L: CABLE LOSS

Notes:

1. Frequency range of measurement = 2310 MHz ~ 2400 MHz
2. Total = Reading Value + Antenna Factor + Cable Loss + Distance Factor + D.C.C.F
3. Spectrum setting:
   - Peak Setting 1 GHz – 25 GHz, RBW = 1 MHz, VBW = 3 MHz.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna
5. Measurement distance : 3.75 m

Operation Mode ANT+

Operating Frequency 2480 MHz

Frequency [MHz]	Reading [dBuV/m]	A.F.+CL +D.F [dB]	Ant. Pol. [H/V]	D.C.C.F [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	24.63	35.73	H	0	60.36	73.98	13.62	PK
2483.5	24.63	35.73	H	-24.37	35.99	53.98	17.99	AV
2483.5	23.77	35.73	V	0	59.50	73.98	14.48	PK
2483.5	23.77	35.73	V	-24.37	35.13	53.98	18.85	AV

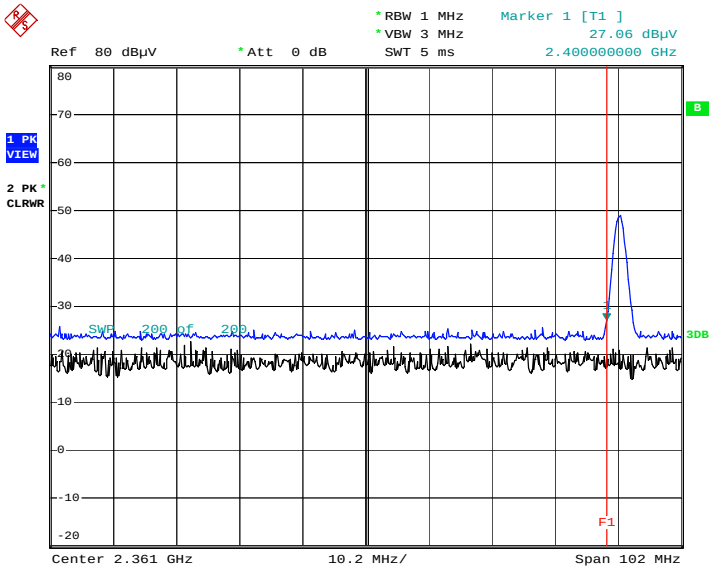
※ A·F: ANTENNA FACTOR
C·L: CABLE LOSS

Notes:

1. Frequency range of measurement = 2483.5 MHz ~ 2500 MHz
2. Total = Reading Value + Antenna Factor + Cable Loss + Distance Factor + D.C.C.F
3. Spectrum setting:
   - Peak Setting 1 GHz – 25 GHz, RBW = 1 MHz, VBW = 3 MHz.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. Measurement distance : 3.75 m

▣ RESULT PLOTS (Worst case : X-H)

Radiated Band Edges plot – Peak Reading (Ch.0)



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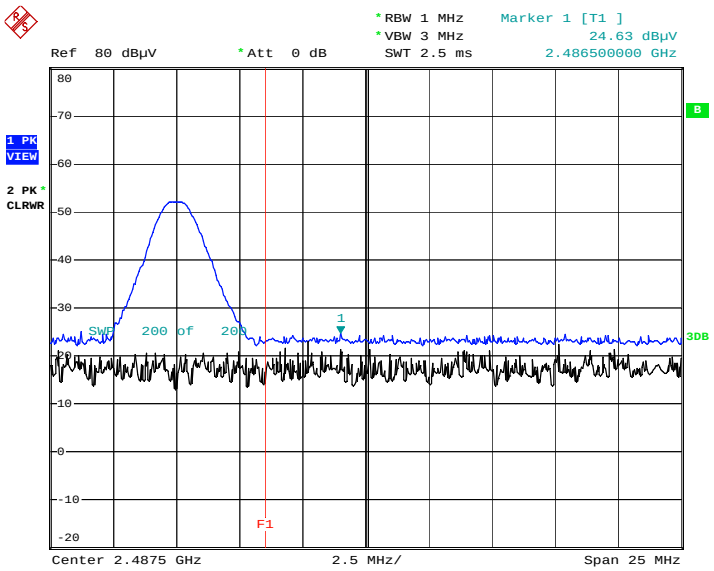
Radiated Band Edges plot – Peak Reading (Ch.78)



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Note : We attached Only the worst case plots for Radiated Band Edges.

9.4 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

For an intentional radiator which 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 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor

▣ RESULT PLOTS

Conducted Emissions (Line 1)

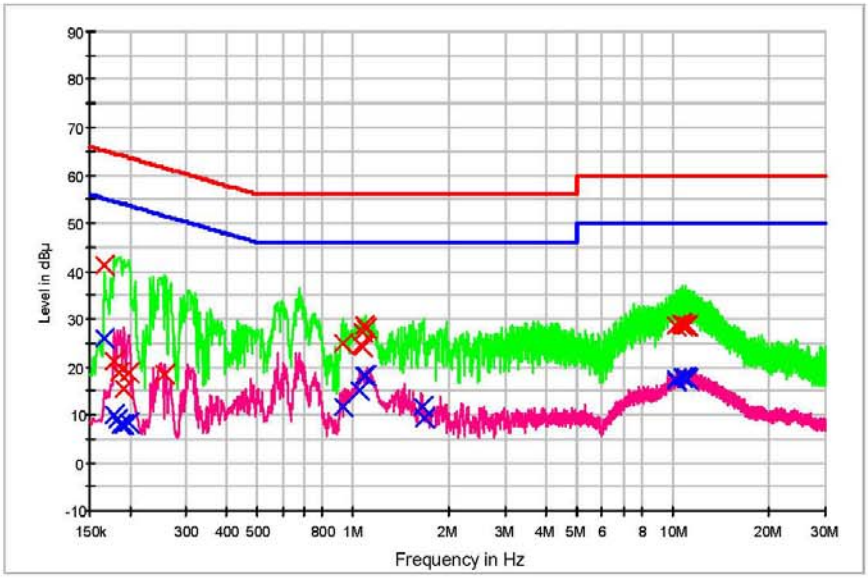
EMI Auto Test(20) 1 / 2

HCT TEST Report

Common Information

EUT:	SM-G885F
Manufacturer:	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions:	ANT+ MODE

FCC CLASS B_Exten Cable



FCC CLASS B_QP
Preview Result 2-AVG
FCC CLASS B_AV
Final Result 1-QPK
Preview Result 1-PK+
Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	41.3	9.000	Off	N	9.7	23.8	65.2
0.178000	21.2	9.000	Off	N	9.7	43.4	64.6
0.186000	18.7	9.000	Off	N	9.7	45.5	64.2
0.192000	15.5	9.000	Off	N	9.7	48.5	63.9
0.198000	18.9	9.000	Off	N	9.7	44.8	63.7
0.258000	18.5	9.000	Off	N	9.7	43.0	61.5
0.930000	24.8	9.000	Off	N	9.8	31.2	56.0
1.060000	24.7	9.000	Off	N	9.8	31.3	56.0
1.064000	24.2	9.000	Off	N	9.8	31.8	56.0
1.074000	27.4	9.000	Off	N	9.8	28.6	56.0
1.088000	28.6	9.000	Off	N	9.8	27.4	56.0
1.098000	28.0	9.000	Off	N	9.8	28.0	56.0
10.276000	28.7	9.000	Off	N	10.3	31.3	60.0
10.596000	28.9	9.000	Off	N	10.3	31.1	60.0
10.682000	28.7	9.000	Off	N	10.3	31.3	60.0
10.772000	29.0	9.000	Off	N	10.3	31.0	60.0
11.014000	28.7	9.000	Off	N	10.3	31.3	60.0
11.124000	28.6	9.000	Off	N	10.3	31.4	60.0

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EMI Auto Test(20) 2 / 2

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.166000	25.9	9.000	Off	N	9.7	29.2	55.2
0.178000	9.9	9.000	Off	N	9.7	44.7	54.6
0.182000	9.1	9.000	Off	N	9.7	45.3	54.4
0.188000	7.9	9.000	Off	N	9.7	46.2	54.1
0.192000	8.0	9.000	Off	N	9.7	46.0	53.9
0.198000	8.3	9.000	Off	N	9.7	45.4	53.7
0.930000	11.7	9.000	Off	N	9.8	34.3	46.0
1.050000	15.2	9.000	Off	N	9.8	30.8	46.0
1.088000	18.2	9.000	Off	N	9.8	27.8	46.0
1.098000	18.1	9.000	Off	N	9.8	27.9	46.0
1.648000	11.8	9.000	Off	N	9.8	34.2	46.0
1.668000	9.4	9.000	Off	N	9.8	36.6	46.0
10.224000	17.1	9.000	Off	N	10.3	32.9	50.0
10.276000	17.6	9.000	Off	N	10.3	32.4	50.0
10.696000	17.9	9.000	Off	N	10.3	32.1	50.0
10.772000	17.9	9.000	Off	N	10.3	32.1	50.0
11.014000	17.9	9.000	Off	N	10.3	32.1	50.0
11.124000	17.6	9.000	Off	N	10.3	32.4	50.0

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Conducted Emissions (Line 2)

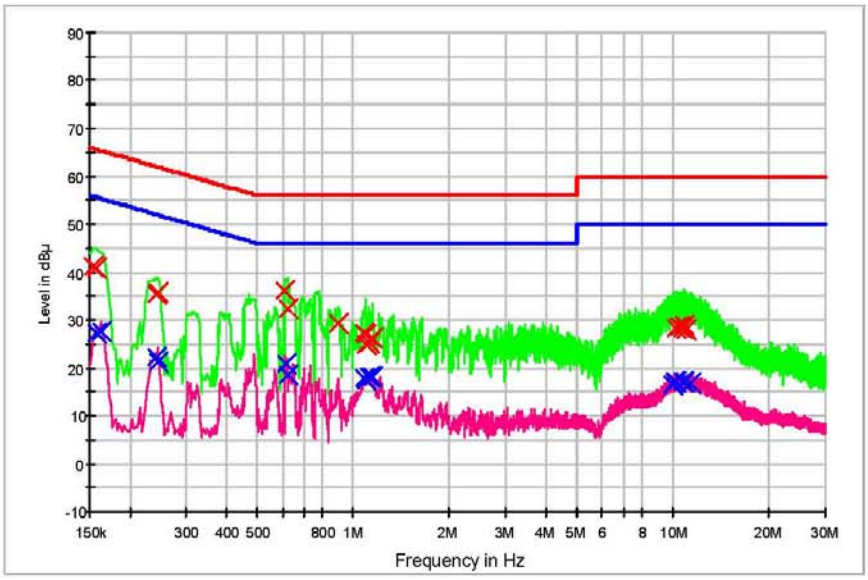
EMI Auto Test(20) 1 / 2

HCT TEST Report

Common Information

EUT:	SM-G885F
Manufacturer:	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions:	ANT+ MODE

FCC CLASS B_Exten Cable



FCC CLASS B_QP
Preview Result 2-AVG
FCC CLASS B_AV
Final Result 1-QPK
Preview Result 1-PK+
Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154000	41.3	9.000	Off	L1	9.7	24.5	65.8
0.158000	40.9	9.000	Off	L1	9.7	24.6	65.6
0.242000	35.4	9.000	Off	L1	9.7	26.7	62.0
0.246000	35.7	9.000	Off	L1	9.7	26.2	61.9
0.614000	36.2	9.000	Off	L1	9.7	19.8	56.0
0.626000	32.5	9.000	Off	L1	9.7	23.5	56.0
0.900000	29.3	9.000	Off	L1	9.8	26.7	56.0
1.086000	27.4	9.000	Off	L1	9.8	28.6	56.0
1.090000	27.0	9.000	Off	L1	9.8	29.0	56.0
1.098000	25.0	9.000	Off	L1	9.8	31.0	56.0
1.124000	25.4	9.000	Off	L1	9.8	30.6	56.0
1.148000	26.1	9.000	Off	L1	9.8	29.9	56.0
10.186000	28.4	9.000	Off	L1	10.2	31.6	60.0
10.266000	28.3	9.000	Off	L1	10.2	31.7	60.0
10.480000	28.6	9.000	Off	L1	10.2	31.4	60.0
10.750000	28.5	9.000	Off	L1	10.2	31.5	60.0
10.822000	28.9	9.000	Off	L1	10.2	31.1	60.0
10.988000	28.1	9.000	Off	L1	10.2	31.9	60.0

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EMI Auto Test(20) 2 / 2

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.158000	27.3	9.000	Off	L1	9.7	28.2	55.6
0.162000	27.5	9.000	Off	L1	9.7	27.9	55.4
0.242000	22.2	9.000	Off	L1	9.7	29.8	52.0
0.246000	21.1	9.000	Off	L1	9.7	30.8	51.9
0.618000	20.8	9.000	Off	L1	9.7	25.2	46.0
0.626000	18.4	9.000	Off	L1	9.7	27.6	46.0
1.086000	17.9	9.000	Off	L1	9.8	28.1	46.0
1.090000	17.6	9.000	Off	L1	9.8	28.4	46.0
1.098000	17.5	9.000	Off	L1	9.8	28.5	46.0
1.124000	18.0	9.000	Off	L1	9.8	28.0	46.0
1.130000	18.2	9.000	Off	L1	9.8	27.8	46.0
1.148000	18.1	9.000	Off	L1	9.8	27.9	46.0
9.948000	16.6	9.000	Off	L1	10.2	33.4	50.0
10.084000	17.3	9.000	Off	L1	10.2	32.7	50.0
10.234000	17.0	9.000	Off	L1	10.2	33.0	50.0
10.750000	17.1	9.000	Off	L1	10.2	32.9	50.0
10.822000	17.1	9.000	Off	L1	10.2	32.9	50.0
11.306000	16.8	9.000	Off	L1	10.2	33.2	50.0

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10.LIST OF TEST EQUIPMENT

10.1 LIST OF TEST EQUIPMENT (Conducted Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	12/20/2017	Annual	102245
Rohde & Schwariz	ESCI / Test Receiver	06/27/2017	Annual	100033
ESPAC	SU-642 /Temperature Chamber	03/30/2018	Annual	0093008124
Agilent	N9020A / Signal Analyzer	06/13/2017	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	11/22/2017	Annual	MY49431210
Agilent	87300B / Directional Coupler	11/20/2017	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	06/12/2017	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/30/2017	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	07/10/2017	Annual	07560
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A

10.2 LIST OF TEST EQUIPMENT (Radiated Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640 /800-XP-ET / Antenna Position Tower	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Audix	Turn Table	N/A	N/A	N/A
Rohde & Schwarz	Loop Antenna	04/06/2017	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/06/2017	Biennial	760
Schwarzbeck	BBHA 9120D / Horn Antenna	06/30/2017	Biennial	9120D-1300
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	12/04/2017	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 30 GHz) / Spectrum Analyzer	07/27/2017	Annual	100843
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/27/2017	Annual	101068-SZ
Wainwright Instruments	F6_HPF3.0 / High Pass Filter	01/03/2018	Annual	F6
Wainwright Instruments	WHKX8-6090-7000-18000-40SS / High Pass Filter	10/27/2017	Annual	24
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	06/30/2017	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/03/2018	Annual	2
Api tech.	18B-03 / Attenuator (3 dB)	06/12/2017	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	07/19/2017	Annual	08285
CERNEX	CBLU1183540B-01 / Power Amplifier	12/26/2017	Annual	25540
CERNEX	CBL06185030 / Power Amplifier	03/28/2018	Annual	28550
CERNEX	CBL18265035 / Power Amplifier	01/10/2018	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/30/2017	Annual	25956