Nemko Korea CO., Ltd.

300-2, Osan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, KOREA
TEL:+82 31 322 2333 FAX:+82 31 322 2332

FCC and IC EVALUATION REPORT FOR CERTIFICATION

Applicant :

Samsung Electronics Co., Ltd.
416, Maetan-3Dong, Yeongtong-Gu,
Suwon-Si, Gyeonggi-Do, Korea.
(Post code : 443-742)
Attn. : Mr. Jaywoo. Lee

Dates of Issue : May 11, 2010
Test Report No. : NK-10-R-065
Test Site : Nemko Korea Co., Ltd.

FCC ID	***A3L-HTWDC10***
IC ID	***649E-HTWDC10***
Brand Name	***SAMSUNG***
Contact Person	**Samsung Electronics Co., Ltd.** **416, Maetan-3Dog, Yeongtong-Gu,** **Suwon-Si, Gyeonggi-Do, Korea, 442-742.** **Mr. Jaywoo. Lee** **Telephone No. : +82-31-277-2569**

Applied Standard:	FCC 47 CFR Part 15 and IC RSS-210
Classification:	Digital transmission system
EUT Type:	I-Pod Cradle

The device bearing the brand name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003. The client should not use it to claim product endorsement by TAF or any government agencies. The test results in the report only apply to the tested sample.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

May 11, 2010
Tested By : Minchul Shin
Engineer

May. 11. 2010
Reviewed By : H.H. Kim
Manager & Chief Engineer

TABLE OF CONTENTS

1. SCOPE

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15 and IC RSS-210.

Responsible Party :	Samsung Electronics Co., Ltd.
Contact Person :	Mr. Jaywoo. Lee
Manufacturer :	Samsung Electronics Co., Ltd. 416 Maetan-3Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742 KOREA

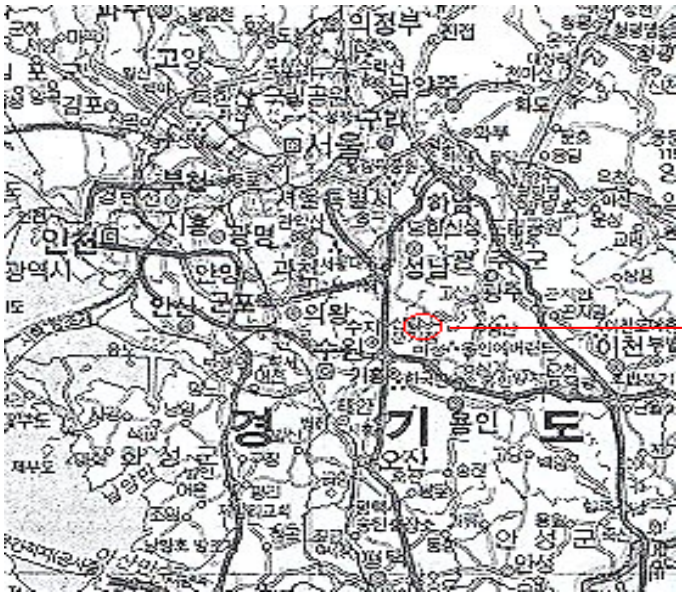
- FCC ID: A3L-HTWDC10
- IC ID: 649E-HTWDC10
- Model: HT-WDC10
- Brand Name: SAMSUNG
- EUT Type: I-Pod Cradle
- Classification: Digital transmission system
- Applied Standard: FCC 47 CFR Part 15 subpart C and IC RSS-210
- Test Procedure(s): ANSI C63.4 (2003)
- Dates of Test: Mar. 31, 2010 ~ Apr. 27, 2010
- Place of Tests: Nemko Korea Co., Ltd.

2. INTRODUCTION

2.1 Test facility

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003) was used in determining radiated and conducted emissions emanating from **Samsung Electronics Co., Ltd.**
FCC ID : **A3LHTWDC10** and **IC ID : 649E-HTWDC10**

These measurement tests were conducted at ***Nemko Korea Co., Ltd. EMC Laboratory*** .
The site address is 300-2, Osan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, KOREA.
The area of Nemko Korea Corporation Ltd. EMC Test Site is located in a mountain area at 80 kilo-meters (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 kilometers (18miles) south-southeast from central Seoul.
It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures.
The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 2003.



Nemko Korea Co., Ltd.
EMC Lab.
300-2, Osan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, KOREA 449-852
Tel)+82-31-322-2333

Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows Nemko Korea Corporation Ltd. EMC Lab. and Incheon Airport.

2.2 Accreditation and listing

Accreditation type		Accreditation number
FC	FCC part 15/18 Filing site	Registration No. 97992
	CAB Accreditation for DOC	Designation No. KR0026
KOLAS	KOLAS Accredited Lab. (Korea Laboratory Accreditation Scheme)	Registration No. 155
Industry Canada	Canada IC Registered site	Site No. 2040E-1
VCCI	VCCI registration site(RE/CE/Telecom CE)	Member No. 2118
IECEE CB SCHEME	EMC CBTL	-
방송통신위원회	KCC(RRL)Designated Lab.	Registration No. KR0026
	SASO registered Lab and Certification Body	Registration No. 2008-15

3. TEST CONDITIONS & EUT INFORMATION

3.1 Operation During Test

The EUT was controlled by pushing the ID set button on back of the EUT according to manufacturer's test procedure.
The EUT have two antennas which are not working simultaneously. All tests were performed the worst case antenna path at the Lowest, Middle, Highest channel.

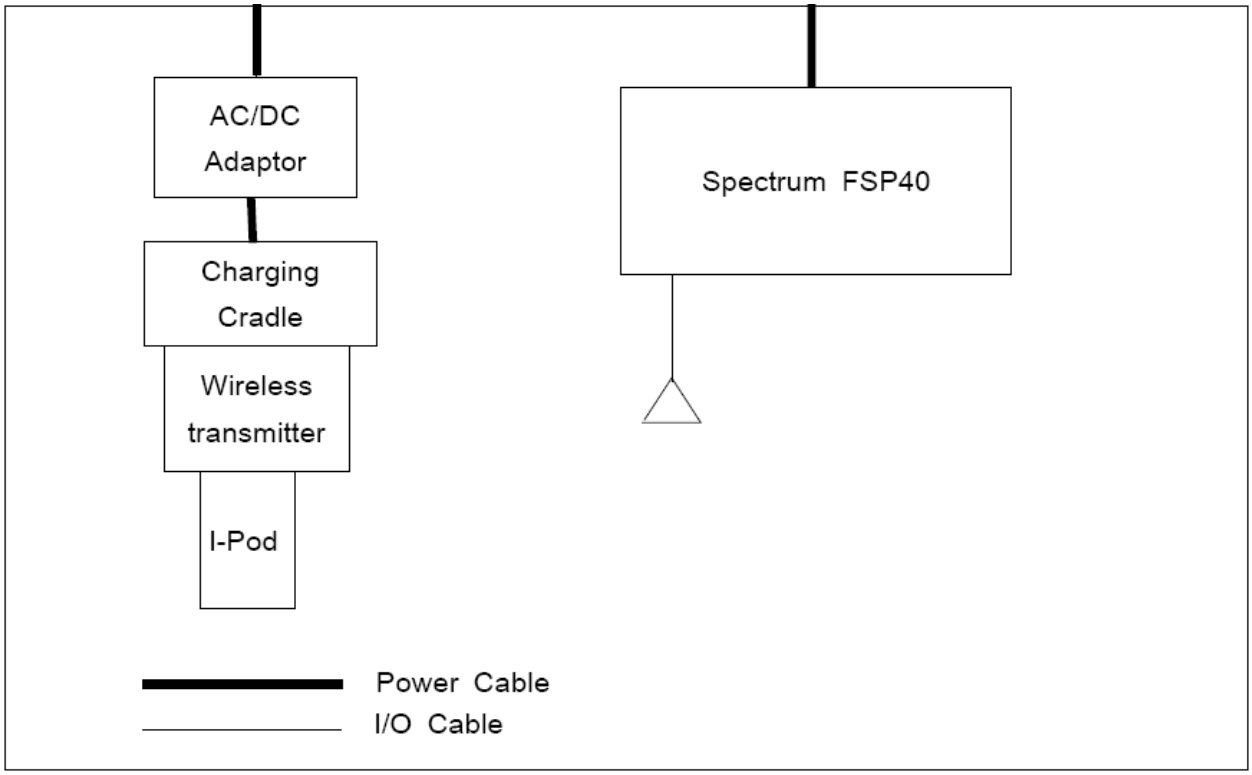
Test frequency

Channel	Frequency (MHz)
1	5736
2	5762
3	5814

3.2 Support Equipment

Wireless Transmitter (EUT)	Samsung Electronics Co., Ltd. FCC ID: A3LHTWDC10	S/N: N/A
Charging Cradle	Samsung Electronics Co., Ltd. Model : -	S/N: N/A
AC/DC adaptor	Dongguan Samsung Electro-Mechanics Co.,Ltd. Model :AD-1005S 1.5 m shielded cable	S/N: N/A
I-Pod	Apple Inc. Model: A1288 FCC ID: BCGA1288	S/N: 9C011S4B75J

3.3 Setup Drawing



3.4 EUT Information

The EUT is the **Samsung I-Pod Cradle FCC ID: A3LHTWDC10, IC ID: 649E-HTWDC10.**

Specifications:

Category:	I-Pod Cradle
Model Name:	HT-WDC10
Brand Name:	SAMSUNG
Frequency of Operation	5736 MHz to 5814 MHz
Power Output (Conducted)	7.17 dBm
Channels	3 ch
Antenna Gain (Max)	3.72 dBi
Modulations	QPSK
Temperature Range	-10 ℃ ~ +55 ℃
Voltage	3.7 Vdc
Dimensions (W x H x D)	42 mm x 87 mm X 27 mm
Weight	60 g
Remarks:	-

4. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	FCC Paragraph No.	IC Paragraph No.	Result	Remark
Conducted Emission	15.107 15.207	RSS-GEN	Complies	
Radiated Emission	15.109 15.205 15.209	RSS-210 Clause 2.6, RSS-GEN Clause 6	Complies	
6 dB Bandwidth	15.247(a)(2)	RSS-210 A8.2 (a)	Complies	
Peak Power Output	15.247(b)(3)	RSS-210 Issue 7 Clause A8.4	Complies	
Power Spectral Density	15.247(e)	RSS-210 Clause A8.2	Complies	
Conducted Spurious Emission	15.247(d)	IC RSS-210 A8.5	Complies	
Radiated Spurious Emission	15.247(d)	RSS-210 Clause 2.6, RSS-GEN Clause 6	Complies	
Maximum Permissible Exposure	1.1307(b)	RSS-102	Complies	

5. RECOMMENDATION/CONCLUSION

The data collected shows that the **Samsung Audio transceiver module FCC ID: A3LHTWDC10, IC ID: 649E-HTWDC10** is in compliance with Part 15 Subpart C 15.247 of the FCC Rules.

6. ANTENNA REQUIREMENTS

§15.203 of the FCC Rules part 15 Subpart C

: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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 antenna of the **Samsung I-Pod Cradle FCC ID: A3LHTWDC10, IC ID: 649E-HTWDC10** is **permanently attached** and there are no provisions for connection to an external antenna. It complies with the requirement of §15.203.

7. DESCRIPTION OF TESTS

7.1 Conducted Emissions

The Line conducted emission test facility is located inside a 4 x 7 x 2.5 meter shielded enclosure.
It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6.
A 1m X 1.5m wooden table 0.8m height is placed 0.4m away from the vertical wall and 1.5m away from the side of wall of the shielded room Rohde & Schwarz (ESH3-Z5) and Rohde & Schwarz(ESH2-Z5) of the 50 ohm/50 uH Line Impedance Stabilization Network(LISN) are bonded to the shielded room.
The EUT is powered from the Rohde & Schwarz (ESH3-Z5)LISN and the support equipment is powered from the Rohde & Schwarz (ESH2-Z5)LISN. Power to the LISNs are filtered by high-current high insertion loss Power line filters. The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1/2".
If DC power device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the LISNs, All interconnecting cables more than 1 meter were shortened by non inductive bundling (serpentine fashion) to a 1 meter length.
Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.
The spectrum was scanned from 150 kHz to 30 MHz with 200 msec sweep time.
The frequency producing the maximum level was re-examined using the EMI test receiver.
(Rohde & Schwarz ESCS30).
The detector function were set to CISPR quasi-peak mode & average mode.
The bandwidth of receiver was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.
Each emission was maximized by; switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; which ever determined the worst case emission.
Each EME reported was calibrated using the R&S signal generator.

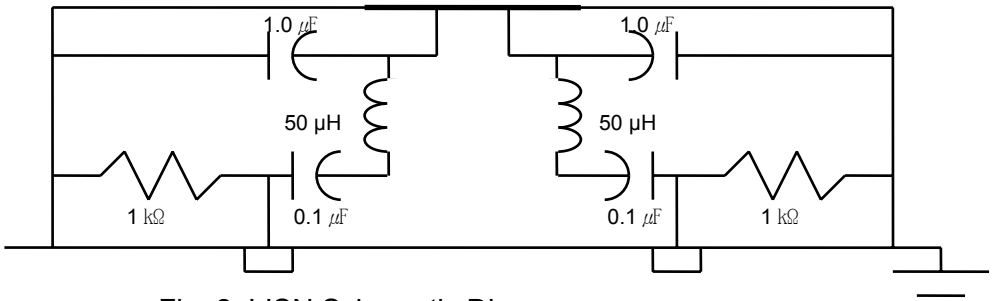


Fig. 2. LISN Schematic Diagram

7.2 Radiated Emissions

Preliminary measurement were made indoors at 3 meter using broad band antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The Technology configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was note for each frequency found. The spectrum was scanned from 9 kHz to 30 MHz using Loop Antenne(EMCO, 6502) and 30 to 1000 MHz using Bi-conical log Antenna(ARA, LPB-2520/A). Above 1 GHz, Horn antenna (Scwarzbeck BBHA 9120D: upto 18 GHz , BBHA9170 : upto 40 GHz) was used. Final Measurements were made outdoors at 3 or 10 m test range using Loop Antenne(EMCO, 6502) and Logbicon Super Antenna (Schwarzbeck, VULB9168) or Horn antenna.(Scwarzbeck BBHA 9120D: upto 18 GHz , BBHA9170 : upto 40 GHz).
The test equipment was placed on a wooden table. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.
Each frequency found during pre-scan measurements was reexamined and investigated using EMI test receiver(ESCS30). & Spectrum analyzer(FSP40). The detector function was set to CISPR peak mode or quasi-peak mode or average mode and the band-width of the receiver was set to 120 kHz or 1 MHz depending on the frequency or type of signal. The half wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT support equipment and interconnecting cables were re configured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8 m high non- metallic 1.0 x 1.5 meter table. The EUT, support equipment and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turn table containing the Technology was rotated; the antenna height was varied 1 to 4meter and stopped at the azimuth or height producing the maximum emission Each emission was maximized by : switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; which ever determined the worst case emission.

Each EME reported was calibrated using the R/S signal generator.

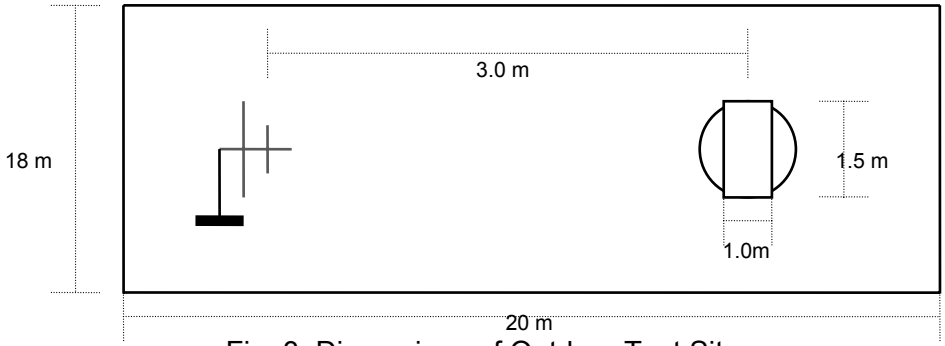
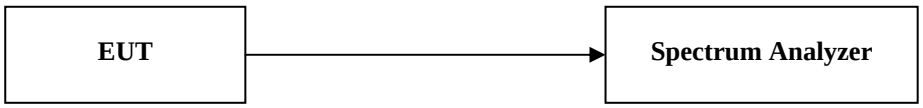


Fig. 3. Dimensions of Outdoor Test Site

7.3 6 dB Bandwidth

Test Setup

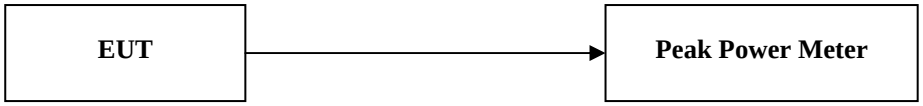


Test Procedure

The transmitter is set to the Low, Middle, High channels is connected to the spectrum analyzer. The spectrum analyzer are set to 100 kHz for RBW and 300 kHz for VBW .
The sweep time is coupled.
The spectrum analyzer is set for peak detected and Max hold scan mode.

7.4 Maximum Peak Output Power

Test Setup

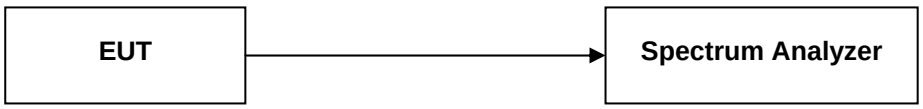


Test Procedure

The transmitter is set to the Low, Middle, High channels is connected to the Peak Power Meter.

7.5 Peak Power Spectral Density

Test Setup

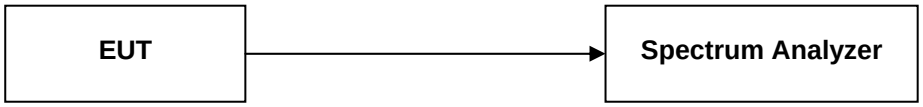


Test Procedure

The transmitter is connected to the Spectrum analyzer.
The maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer.
The RBW of spectrum analyzer is set to 3 kHz and VBW is set to 3 kHz.
The sweep time is set to Span/3 kHz and video averaging is turned off.
The PPSD is the highest level found across the emission in any 3 kHz band.

7.6 Conducted Spurious Emissions

Test Setup



Test Procedure

The transmitter is connected to the spectrum analyzer.
The RBW of spectrum analyzer is set to 1 MHz and VBW is set to the 1 MHz.
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the Lowest, Middle and highest channels.

8. TEST DATA

8.1 Conducted Emissions

FCC §15.207

WLAN Traffic mode

Frequency	Level(dBμV)		Factor	Line	Limit(dBμV)		Margin(dB)	
(MHz)	Q-Peak	Average	(dB)		Q-Peak	Average	Q-Peak	Average
0.19	54.5	40.5	0.2	N	64.0	54.0	9.5	13.5
0.28	45.9	30.0	0.2	N	62.8	52.8	16.9	22.8
0.38	30.7	24.4	0.2	N	58.3	48.3	27.6	23.9
0.91	37.4	23.5	0.1	L	56.0	46.0	18.6	22.5
0.91	30.9	19.6	0.2	L	56.0	46.0	25.1	26.4
24.33	37.9	31.8	1.6	N	60.0	50.0	22.1	18.2

Line Conducted Emissions Tabulated Data

NOTES:

1. Measurements using CISPR quasi-peak mode & average mode.

2. All modes of operation were investigated and the worst -case emission are reported. See attached Plots.

3. Factor = LISN + Cable Loss

4. LINE : L = Line , N = Neutral

5. The limit is on the FCC Part section 15.207(a)

PLOTS OF EMISSIONS

- ***Conducted Emission at the Mains port (WLAN Traffic mode, Line)***

NEMKO KOREA (NK-10-R-065) 26 Apr 2010 11:51

Conducted Emissions

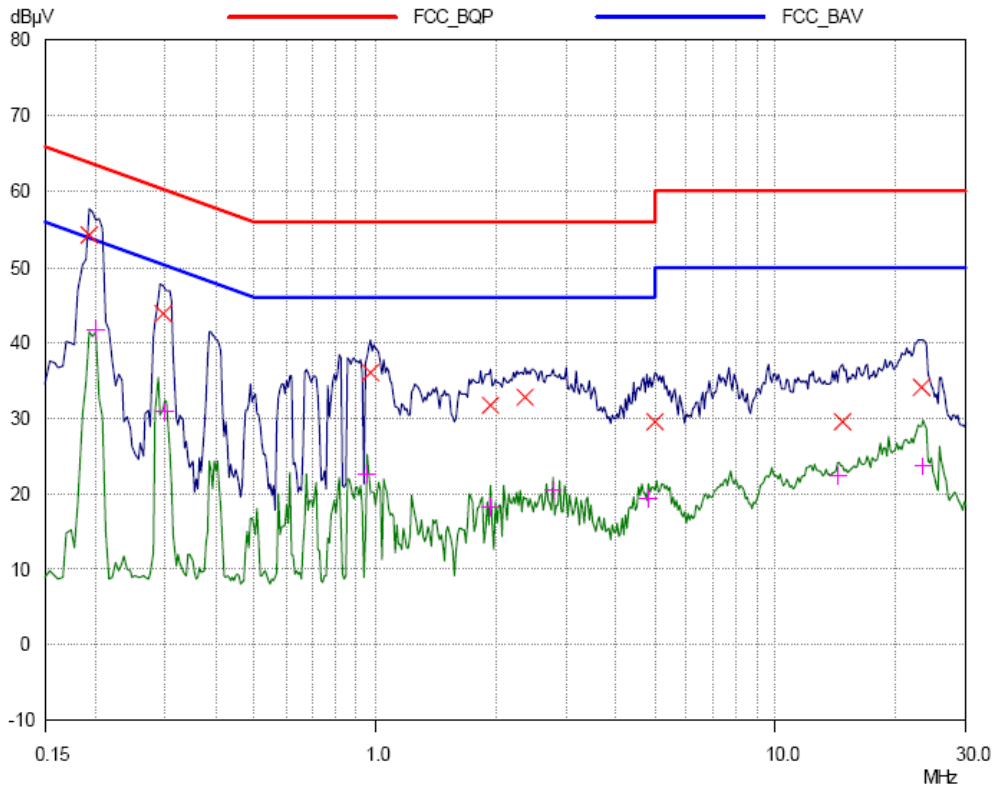
EUT:	iPod cradle
Manuf:	Samsung Electronics
Op Cond:	a.c. 120 V, 60 Hz (WLAN Traffic mode)
Operator:	Min-chul. Shin
Test Spec:	FCC Part 15 15.207
Comment:	Model : HT-WDC10 LINE : L1

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	20 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	ESH3_LINE

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	8
	Acc Margin:	30 dB



PLOTS OF EMISSIONS

- ***Conducted Emission at the Mains port (WLAN Traffic mode, Neutral)***

NEMKO KOREA (NK-10-R-065) 26 Apr 2010 11:40

Conducted Emissions

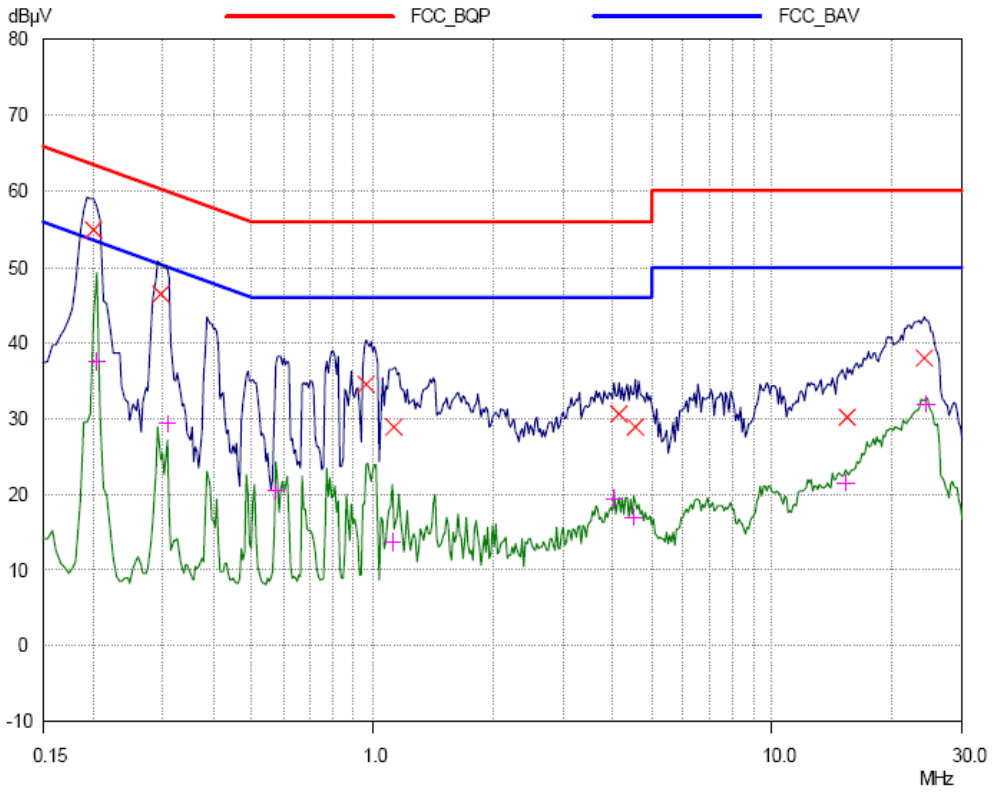
EUT:	iPod cradle
Manuf:	Samsung Electronics
Op Cond:	a.c. 120 V, 60 Hz (WLAN Traffic mode)
Operator:	Min-chul. Shin
Test Spec:	FCC Part 15 15.207
Comment:	Model : HT-WDC10
	LINE : Neutral

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	20 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	ESH3_NEUT

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	8
	Acc Margin:	30 dB



8.2 Radiated Emissions

FCC §15.209, 15. 205, IC RSS-210 Clause 2.6, IC RSS-GEN Clause 6

WLAN Traffic mode

Frequency (MHz)	Reading (dBμV/m)	Pol* (H/V)	Antenna Heights (cm)	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
40.12	44.1	V	100	-17.0	27.1	40.0	12.9
47.28	45.1	V	101	-17.0	28.1	40.0	11.9
55.61	47.6	V	100	-16.6	31.0	40.0	9.0
59.93	47.5	V	107	-16.6	30.9	40.0	9.1
286.00	45.6	V	110	-15.5	30.1	46.0	15.9
396.00	47.8	V	102	-13.6	34.2	46.0	11.8

Radiated Measurements at 3meters

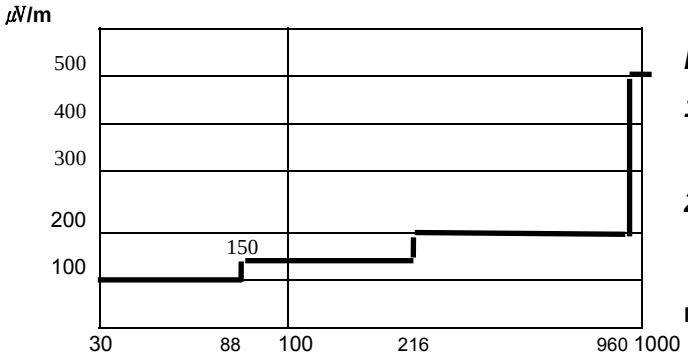


Fig. 4. Limits at 3 meters

NOTES:

1. All modes were measured and the worst-case emission was reported.

2 The radiated limits are shown on Figure 4. Above 1 GHz the limit is 500 μV/m.

NOTES:

1. *Pol. H = Horizontal, V = Vertical

2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.

3. Measurements using CISPR quasi-peak mode.

4. The limit is on the FCC Part section 15.209(a).

8.3 6 dB Modulated Bandwidth

FCC §15.247(a), IC RSS-210 A8.2(a)

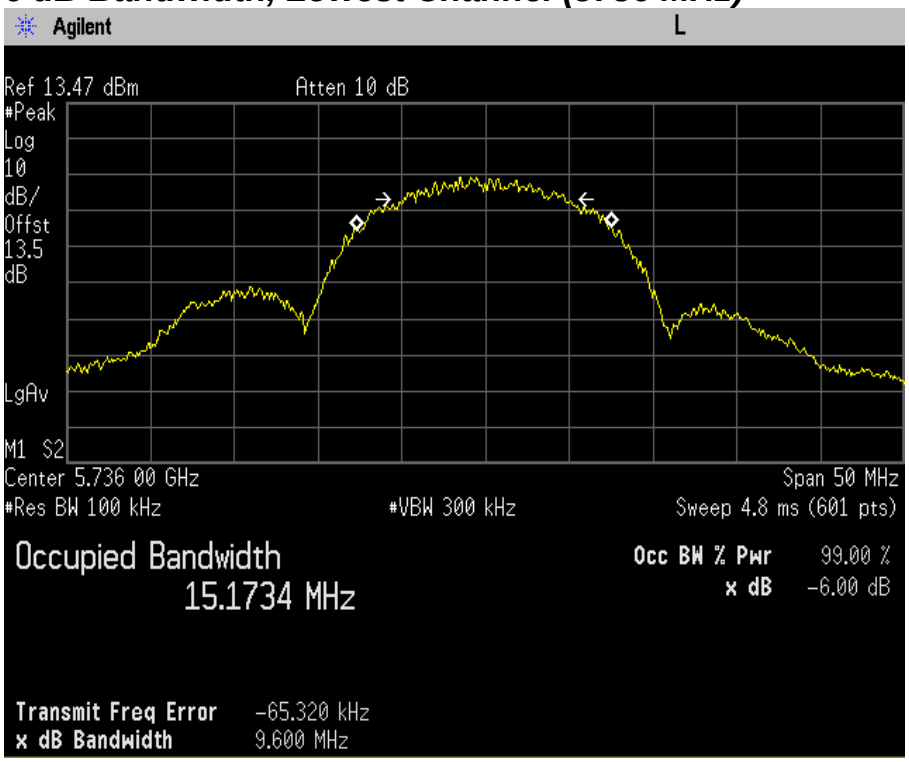
Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

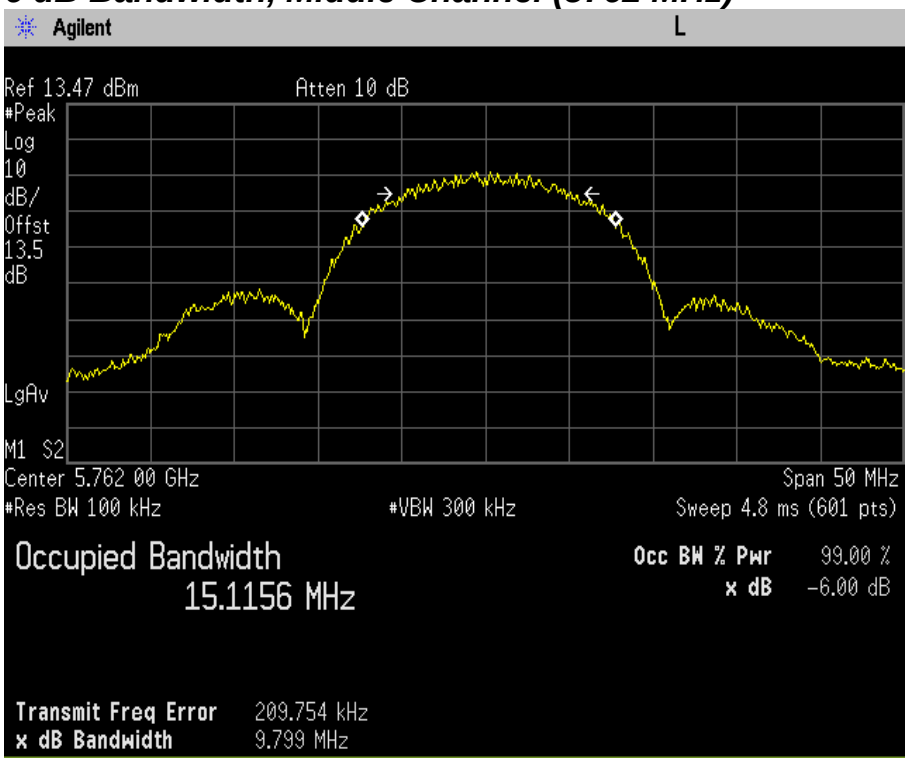
Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	5736	9600	500	9100
Middle	5762	9799	500	9299
High	5814	9448	500	8948

PLOTS OF EMISSIONS

6 dB Bandwidth, Lowest Channel (5736 MHz)

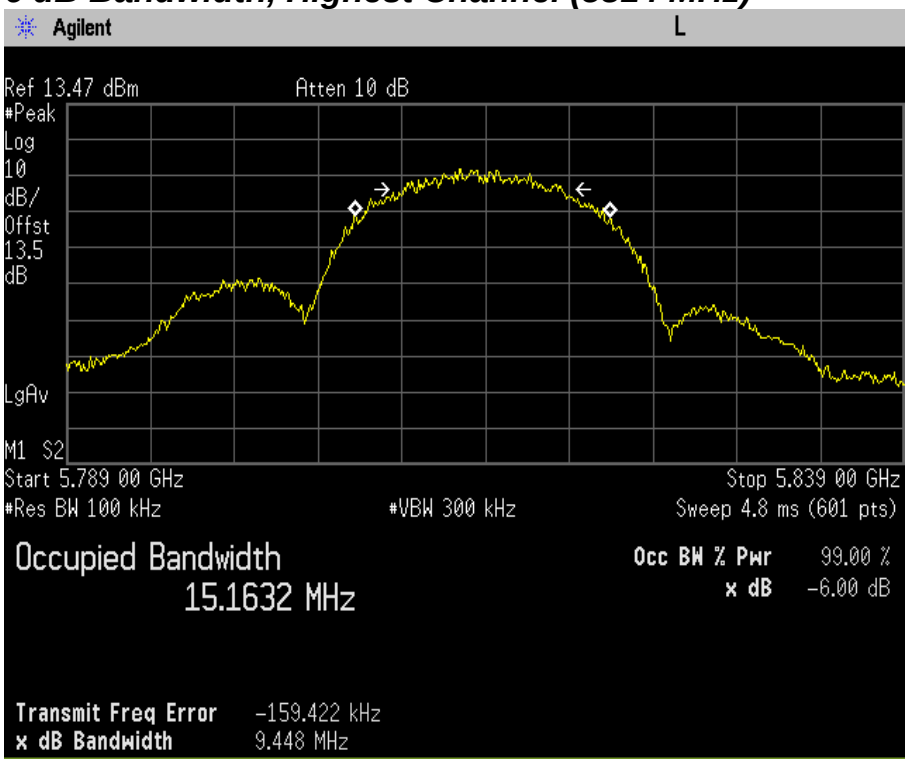


6 dB Bandwidth, Middle Channel (5762 MHz)



PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (5814 MHz)



8.4 Peak Power Output

FCC §15.247(b), IC RSS-210 Issue 7 Clause A8.4

Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

Channel	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Margin (dB)
Low	5736	4.32	30.00	25.68
Middle	5762	5.56	30.00	24.44
High	5814	7.17	30.00	22.83

8.5 Power Spectral Density

FCC §15.247(e), IC RSS-210 Issue 7 Clause A8.2

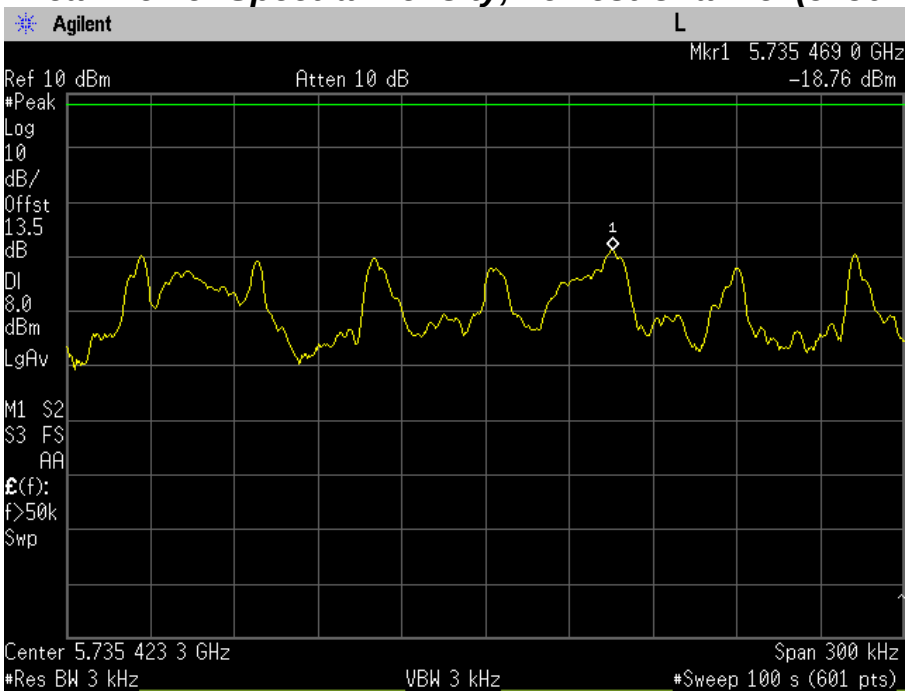
Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

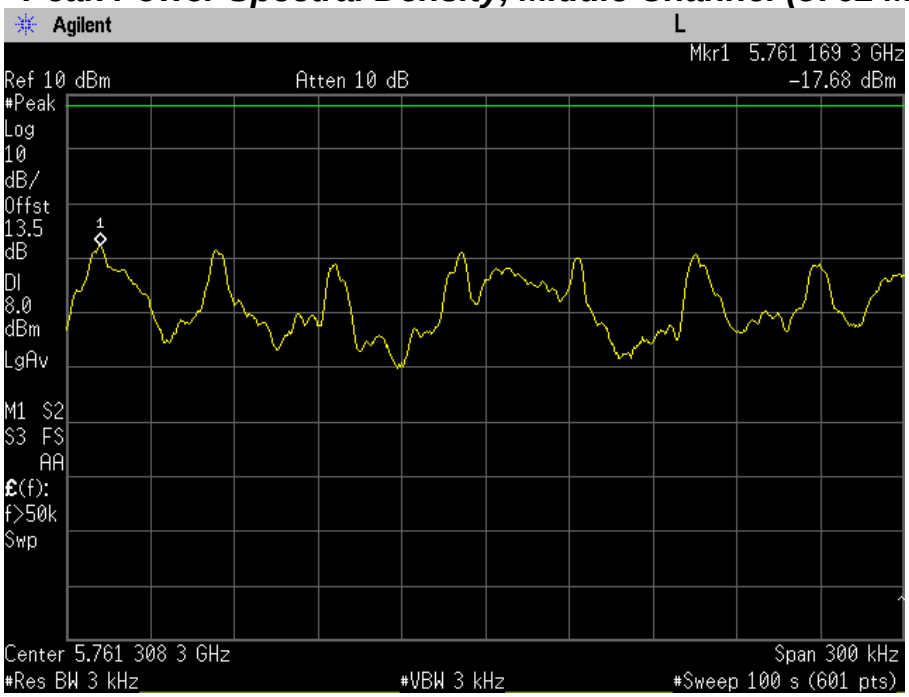
Channel	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dB)
Low	5736	-18.76	8	26.76
Middle	5762	-17.68	8	25.68
High	5814	-16.38	8	24.38

5 GHZ mode

Peak Power Spectral Density, Lowest Channel (5736 MHz)

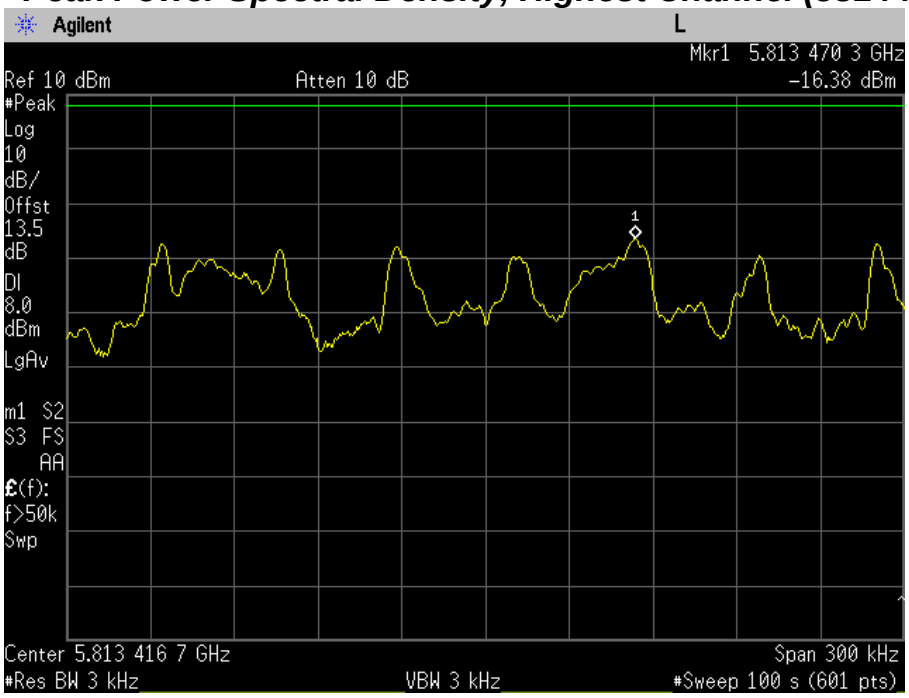


Peak Power Spectral Density, Middle Channel (5762 MHz)



PLOT OF TEST DATA

Peak Power Spectral Density, Highest Channel (5814 MHz)



8.6 Conducted Spurious Emissions

FCC §15.247(d), IC RSS-210 A8.5

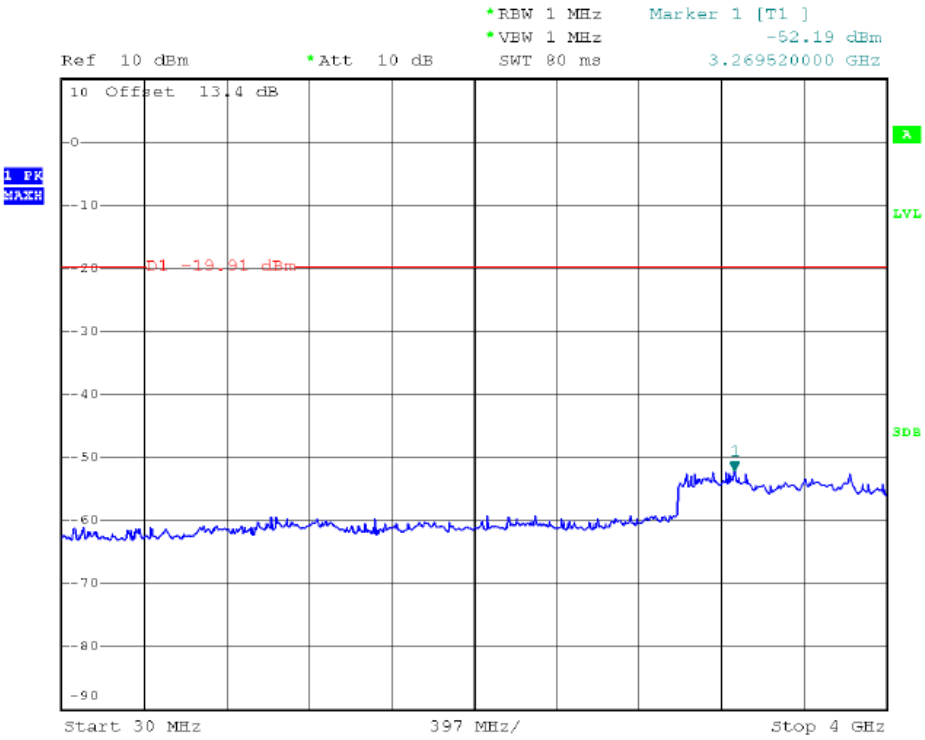
Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

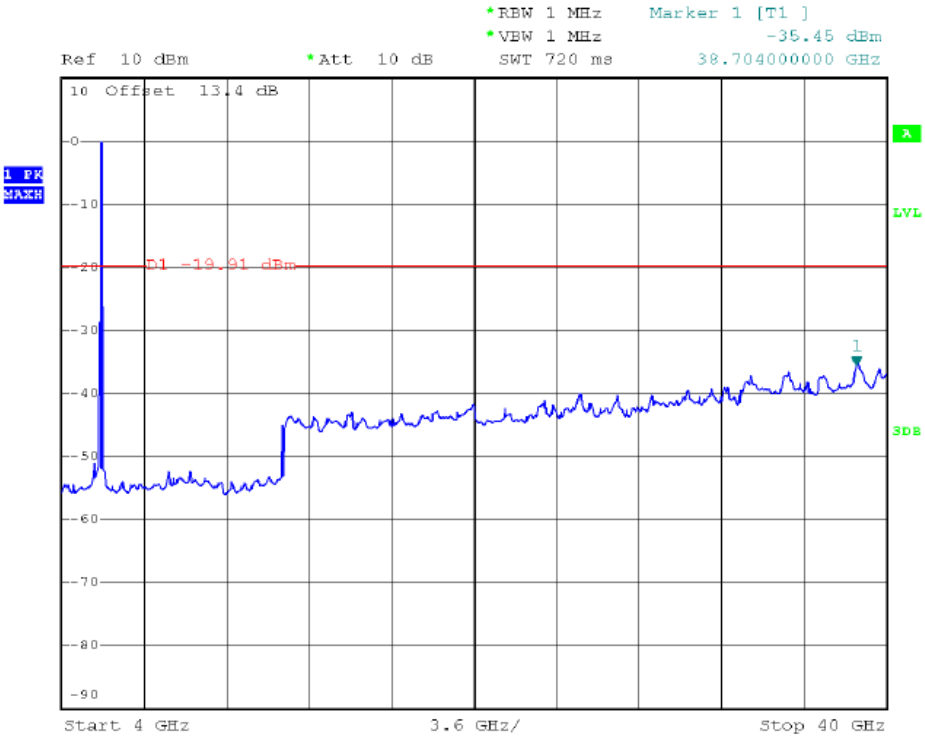
Channel	Frequency(MHz)	Result(dBc)	Limit(dBc)
Low	5736	More than 20 dBc	20
Middle	5762	More than 20 dBc	20
High	5814	More than 20 dBc	20

PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 4 GHz (5736 MHz)

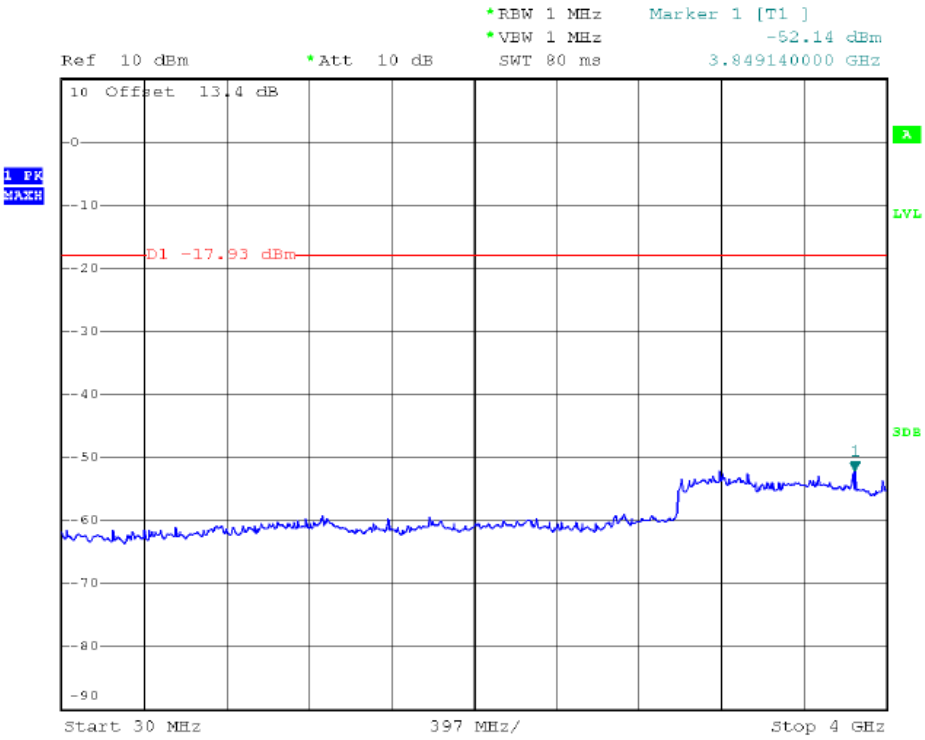


Conducted Spurious Emissions, 4 GHz ~ 40 GHz (5736 MHz)

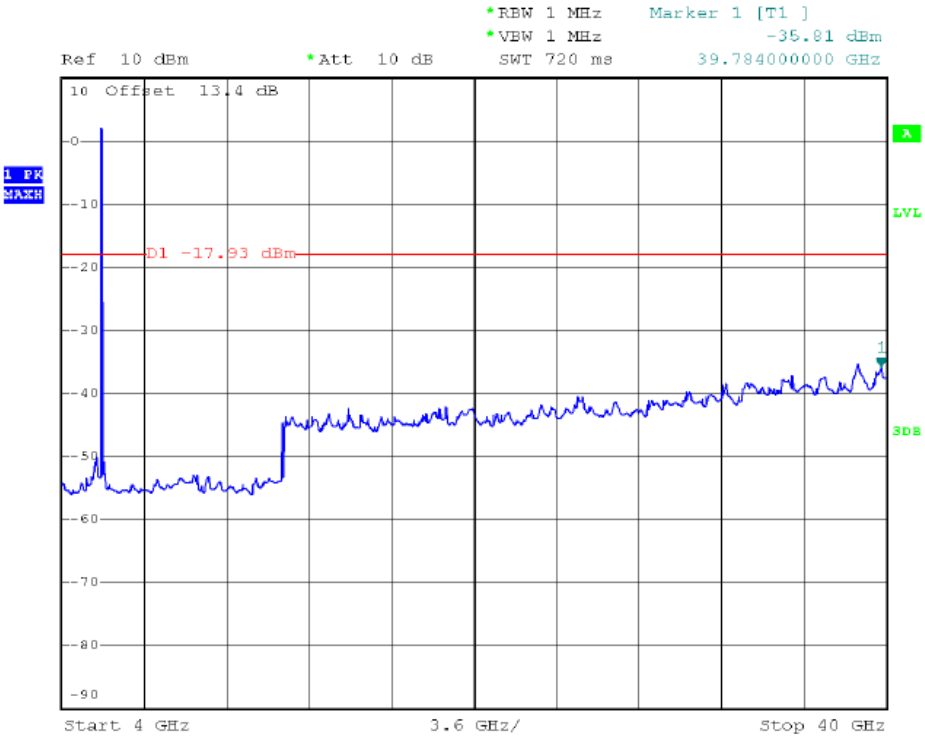


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 4 GHz (5762 MHz)

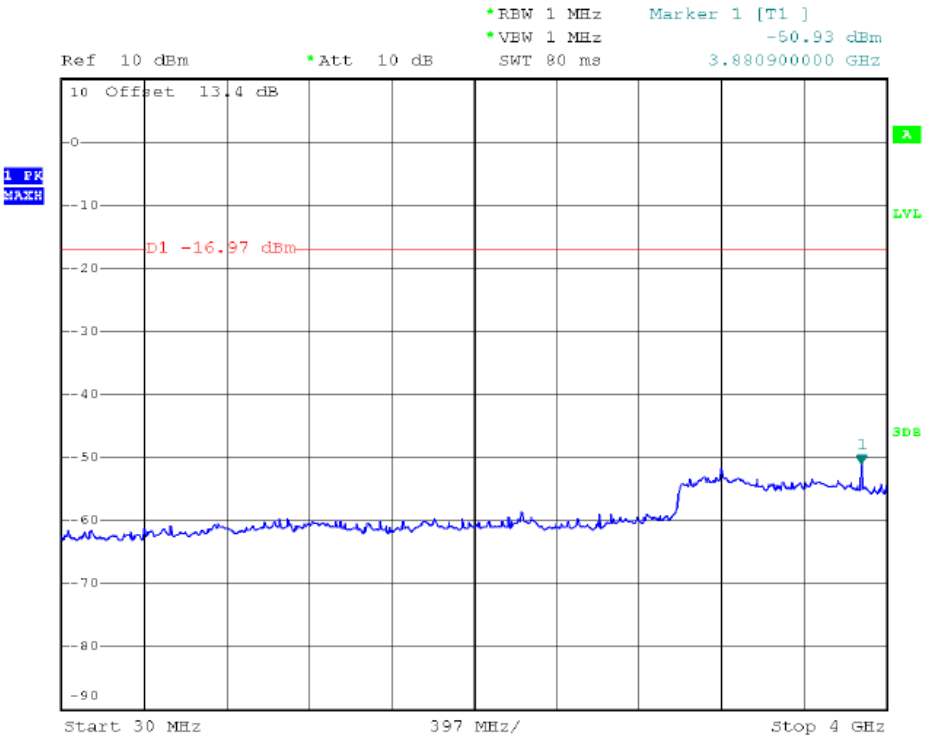


Conducted Spurious Emissions, 4 GHz ~ 40 GHz (5762 MHz)

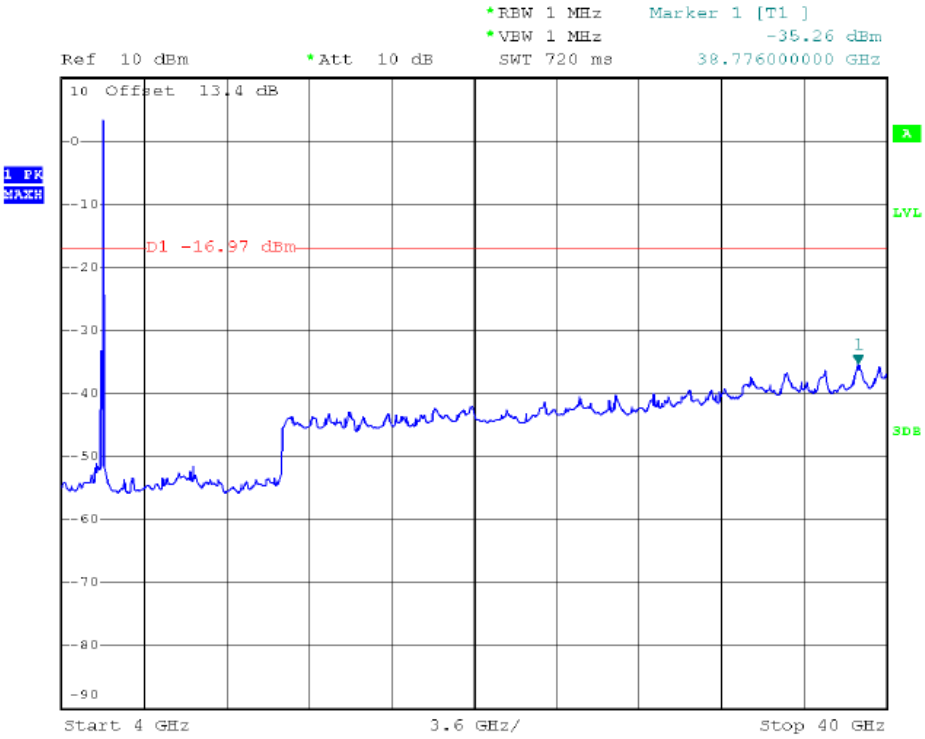


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 4 GHz (5814 MHz)

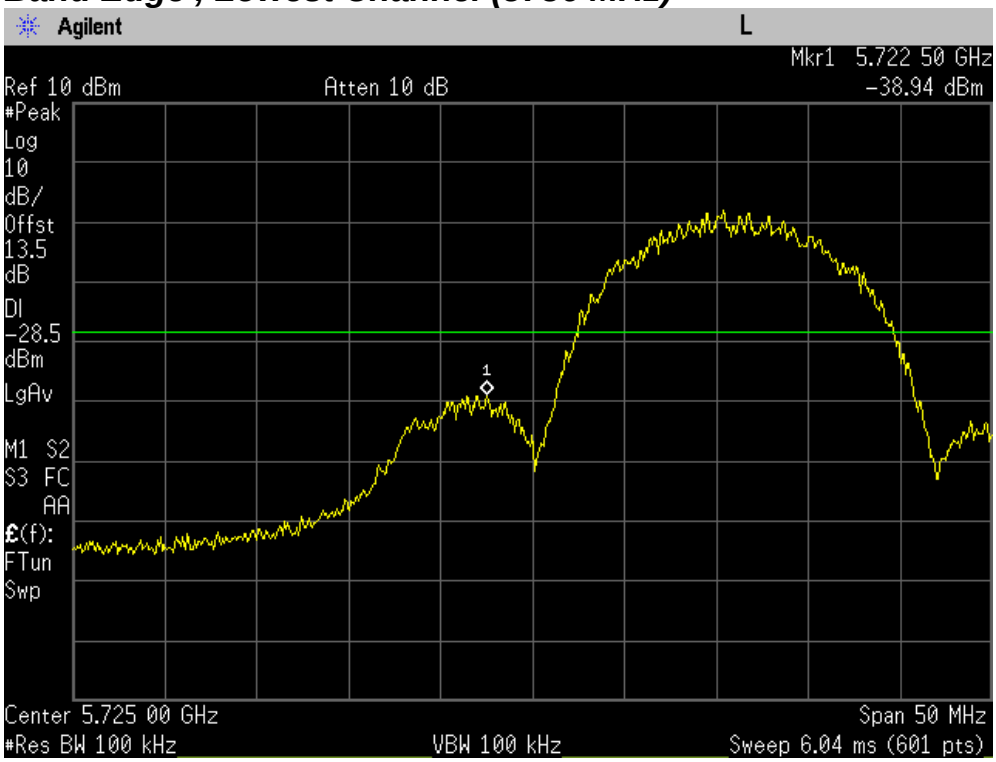


Conducted Spurious Emissions, 4 GHz ~ 40 GHz (5814 MHz)

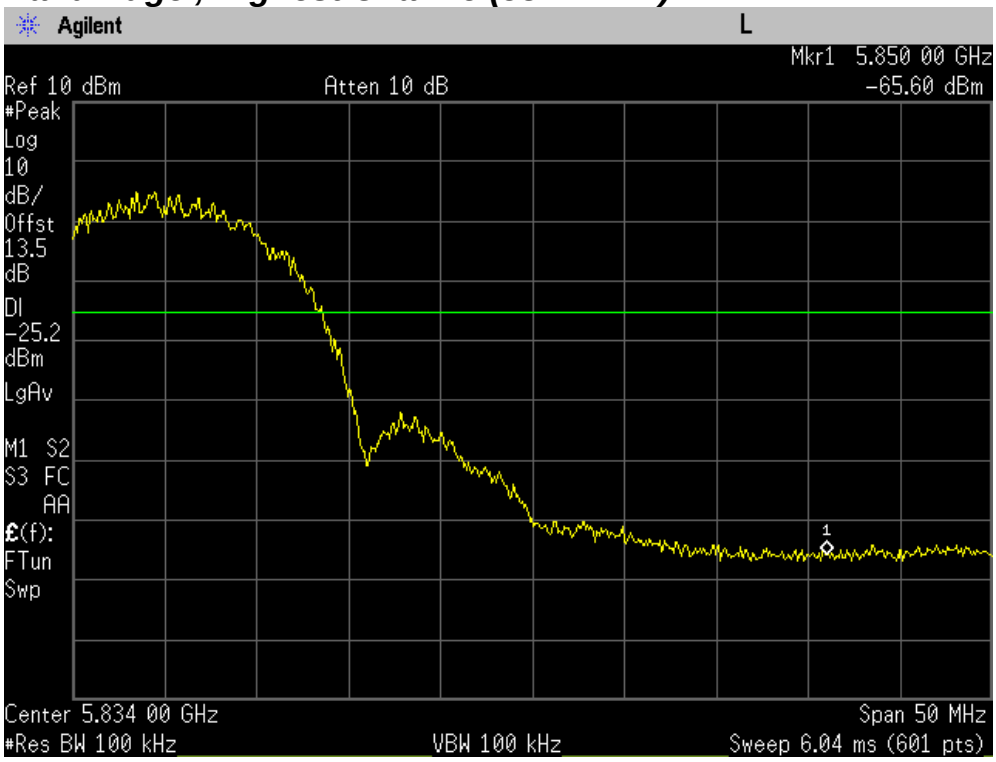


PLOT OF TEST DATA

Band Edge , Lowest Channel (5736 MHz)



Band Edge , Highest Channel(5814 MHz)



8.7 Radiated Spurious Emissions

FCC §15.247(d), IC RSS-210 Clause 2.6, IC RSS-GEN Clause 6

Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
11472	22.89	H	peak	40.88	63.77	74.0	10.23
11472	9.21	H	average	40.88	50.09	54.0	3.91
11472	23.76	V	peak	40.88	64.64	74.0	9.36
11472	10.12	V	average	40.88	51.00	54.0	3.00
17208	45.29	H	peak	12.24	57.53	74.0	16.47
17208	35.29	H	average	12.24	47.53	54.0	6.47
17208	47.97	V	peak	12.24	60.21	74.0	13.79
17208	36.62	V	average	12.24	48.86	54.0	5.14

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
11524	22.54	H	peak	41.10	63.64	74.0	10.36
11524	9.41	H	average	41.10	50.51	54.0	3.49
11524	24.09	V	peak	41.10	65.19	74.0	8.81
11524	9.93	V	average	41.10	51.03	54.0	2.97
17286	47.79	H	peak	10.88	58.67	74.0	15.33
17286	37.48	H	average	10.88	48.36	54.0	5.64
17286	47.92	V	peak	10.88	58.8	74.0	15.20
17286	36.78	V	average	10.88	47.7	54.0	6.34

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
11628	23.22	H	peak	40.40	63.62	74.0	10.38
11628	9.89	H	average	40.40	50.29	54.0	3.71
11628	23.73	V	peak	40.40	64.13	74.0	9.87
11628	10.15	V	average	40.40	50.55	54.0	3.45
17442	47.92	H	peak	12.17	60.09	74.0	13.91
17442	37.65	H	average	12.17	49.82	54.0	4.18
17442	47.04	V	peak	12.17	59.21	74.0	14.79
17442	36.86	V	average	12.17	49.03	54.0	4.97

1. *Pol. H = Horizontal V = Vertical

2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.

3. Other spurious are under 20 dB below Fundamental.

4. For measurements the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

5. The spectrum is measured from 9 kHz to 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

8.8 Receiver Spurious Emissions

IC RSS-GEN Clause 6

Frequency (MHz)	Reading (dBμV/m)	Pol* (H/V)	Antenna Heights (cm)	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
40.12	44.4	V	100	-17.0	27.4	40.0	12.6
47.28	45.0	V	101	-17.0	28.0	40.0	12.0
55.61	47.1	V	100	-16.6	30.5	40.0	9.5
59.93	47.9	V	107	-16.6	31.3	40.0	8.7
396.00	47.5	V	102	-13.6	33.9	46.0	12.1
3824.00	45.6	V	100	1.1	46.7	54.0	7.3

Radiated Measurements at 3meters

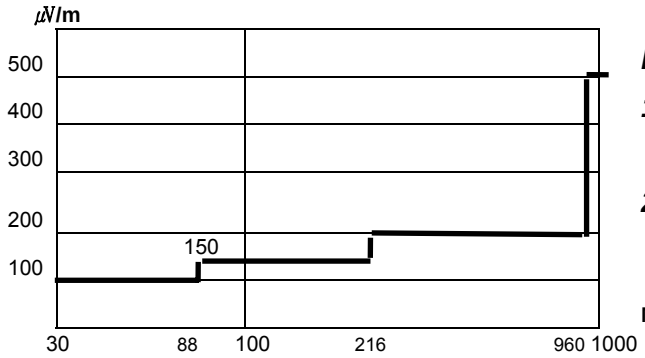


Fig. 5. Limits at 3 meters

NOTES:

1. All modes were measured and the worst-case emission was reported.

2 The radiated limits are shown on Figure 5. Above 1 GHz the limit is 500 μV/m.

NOTES:

1. *Pol. H = Horizontal, V = Vertical

2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.

3. Measurements using CISPR quasi-peak mode.

4. The limit is on the IC RSS GEN Clause 6.

9. MAXIMUM PERMISSIBLE EXPOSURE

RF Exposure Limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the Environmental of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm^2)	Averaging Time (Minutes)
(A) Limits for occupational / Contral Exposure				
30 - 300	61.4	0.163	1	6
300 - 1500	…	…	F/300	6
1500 - 100000	…	…	5	6
(B) Limits for General Population / Uncontrolled Exposure				
30 - 300	27.5	0.073	0.2	30
300 - 1500	…	…	F/1500	30
1500 - 100000	…	…	1	30

F = Frequency (MHz)

Fries formula

Fries transmission formula : $Pd = (Pout * G) / (4 * \pi * r^2)$

$r = \sqrt{((Pout * G) / 4 * \pi * Pd)}$

Where

Pd = Power density in ㎽/㎠

Pout = Output power to antenna in ㎽

G = Gain of antenna in linear scale

π= 3.1416

r = Distance between observation point center of the radiator in cm

Pd is the limit of MPE, 1 ㎽/㎠. If we know the Maximum Gain of the antenna and the total power input to the antenna, through the calculation, we will know the Maximum distance r where the MPE limit is reached and Power density at prediction frequency.

Test Result :

The maximum antenna gain is **3.72 dBi**.

Maximum peak output power at antenna input terminal:	7.17	(dBm)
Maximum peak output power at antenna input terminal:	5.21	(mW)
Antenna gain(typical):	3.72	(dBi)
Maximum antenna gain:	2.36	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5814	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm^2)

Maximum allowable antenna gain:	29.84	(dBi)
Maximum Distance:	0.99	(cm)

Power density at prediction frequency : 0.0024 (mW/cm^2)

Test result: PASS

10. ACCURACY OF MEASUREMENT

The Measurement Uncertainties stated were calculated in accordance with the requirements of measurement uncertainty contained in CISPR 16-4-2 with the confidence level of 95%

1. Conducted Uncertainty Calculation

Source of Uncertainty	Xi	Uncertainty of Xi		Coverage factor k	u(Xi) (dB)	Ci	Ci u(Xi) (dB)
		Value (dB)	Probability Distribution				
Receiver reading	RI	± 0.1	normal 1	1.000	0.1	1	0.1
Attenuation AMN-Receiver	LC	± 0.08	normal 2	2.000	0.04	1	0.04
AMN Voltage division factor	LAMN	± 0.8	normal 2	2.000	0.4	1	0.4
Sine wave voltage	dVSW	± 2.00	normal 2	2.000	1.00	1	1.00
Pulse amplitude response	dVPA	± 1.50	rectangular	1.732	0.87	1	0.87
Pulse repetition rate response	dVPR	± 1.50	rectangular	1.732	0.87	1	0.87
Noise floor proximity	dVNF	± 0.00	-	-	0.00	1	0.00
AMN Impedance	dZ	± 1.80	triangular	2.449	0.73	1	0.73
ⓐ Mismatch	M	+ 0.70	U-Shaped	1.414	0.49	1	0.49
ⓑ Mismatch	M	- 0.80	U-Shaped	1.414	- 0.56	1	- 0.56
Measurement System Repeatability	RS	0.05	normal 1	1.000	0.05	1	0.05
Remark	ⓐ: AMN-Receiver Mismatch : + ⓑ: AMN-Receiver Mismatch : -						
Combined Standard Uncertainty	Normal			± 1.88			
Expended Uncertainty U	Normal (k = 2)			± 3.76			

2. Radiation Uncertainty Calculation

Source of Uncertainty	*Xi*	Uncertainty of *Xi*		Coverage factor *k*	*u(Xi)* (dB)	*Ci*	*Ci u(Xi)* (dB)
		Value (dB)	Probability Distribution				
Receiver reading	***RI***	± 0.10	normal 1	1.000	0.10	1	0.10
Sine wave voltage	***dVsw***	± 2.00	normal 2	2.000	1.00	1	1.00
Pulse amplitude response	***dVpa***	± 1.50	rectangular	1.732	0.87	1	0.87
Pulse repetition rate response	***dVpr***	± 1.50	rectangular	1.732	0.87	1	0.87
Noise floor proximity	***dVnf***	± 0.50	normal 2	2.000	0.25	1	0.25
Antenna Factor Calibration	***AF***	± 1.50	normal 2	2.000	0.75	1	0.75
Attenuation Antenna-receiver	***CL***	± 0.52	normal 2	2.000	0.26	1	0.26
Antenna Directivity	***AD***	± 1.00	rectangular	1.732	0.58	1	0.58
Antenna Factor Height Dependence	***AH***	± 0.50	rectangular	1.732	0.29	1	0.29
Antenna Phase Centre Variation	***AP***	± 0.30	rectangular	1.732	0.17	1	0.17
Antenna Factor Frequency Interpolation	***AI***	± 0.30	rectangular	1.732	0.17	1	0.17
Site Imperfections	***SI***	± 4.00	triangular	2.449	1.63	1	1.63
Measurement Distance Variation	***DV***	± 0.10	rectangular	1.732	0.06	1	0.06
Antenna Balance	***Dbal***	± 0.90	rectangular	1.732	0.52	1	0.52
Cross Polarisation	***DCross***	± 0.90	rectangular	1.732	0.52	1	0.52
ⓐ Mismatch	***M***	+ 0.25	U-Shaped	1.414	0.18	1	0.18
ⓑ Mismatch	***M***	- 0.26	U-Shaped	1.414	- 0.18	1	- 0.18
ⓒ Mismatch	***M***	+ 0.98	U-Shaped	1.414	0.69	1	0.69
ⓓ Mismatch	***M***	- 1.11	U-Shaped	1.414	- 0.79	1	- 0.79
Measurement System Repeatability	***RS***	0.09	normal 1	1.000	0.09	1	0.09
Remark	ⓐ: Biconical Antenna-receiver Mismatch : + (< 200 MHz) ⓑ: Biconical Antenna-receiver Mismatch : - (< 200 MHz) ⓒ: Log Periodic Antenna-receiver Mismatch : + (≧ 200 MHz) ⓓ: Log Periodic Antenna-receiver Mismatch : - (≧ 200 MHz)						
Combined Standard Uncertainty	Normal			± 2.63 (< 200 MHz) ± 2.74 (≧200 MHz)			
Expended Uncertainty U	Normal (*k* = 2)			± 5.26 (< 200 MHz) ± 5.48 (≧200 MHz)			

11. TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Serial No.	Calibration Date	Calibration Interval
1	*Test Receiver	R & S	ESCS 30	833364/020	Mar. 24 2010	1 year
2	*Test Receiver	R & S	ESCS 30	100302	Nov. 11 2009	1 year
3	*Amplifier	HP	8447F	2805A03427	Jul. 20 2009	1 year
4	*Amplifier	Sonoma Instrument	310N	291916	Jul. 22 2009	1 year
5	*Pre Amplifier	HP	8449B	3008A00107	Feb. 03 2010	1 year
6	*Pre Amplifier	HP	8447F	2805A03351	Oct. 12 2009	1 year
7	*Pre Amplifier	Agilent	83051A	3950M00201	Jun. 15 2009	1 year
8	*Spectrum Analyzer	Agilent	E4440A	MY44303257	Jul. 20 2009	1 year
9	*Spectrum Analyzer	Agilent	E4440A	MY44022567	Sep. 04 2009	1 year
10	*Spectrum Analyzer	R & S	FSP40	100361	Sep. 04 2009	1 year
11	*Loop Antenna	EMCO	6502	8911-2436	Jan. 11 2009	2 year
12	*Spectrum Analyzer	R & S	FSP40	100361	Sep. 04 2009	1 year
13	*Power Meter	R & S	NRVS	835360/002	Jan. 15 2010	1 year
14	*Peak Power Sensor	R & S	NRV-Z32	836019/028	Nov. 11 2009	1 year
15	*Biconical Log Antenna	ARA	LPB-2520/A	1209	Dec. 08 2008	2 year
16	*Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-508	Dec.11 2008	2 year
17	*Horn Antenna	SCHWARZBECK	BBHA9170	9170223	Jun. 16 2008	2 year
18	*Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-257	Apr. 10 2010	2 year
19	*Logbicon Antenna	SCHWARZBECK	VULB9166	1067	Oct. 08 2009	2 year
20	Signal Generater	R & S	SMP02	833286/003	Jul. 20 2009	1 year
21	*LISN	R & S	ESH3-Z5	833874/006	Nov. 11 2009	1 year
22	LISN	R & S	ESH2-Z5	100227	Feb. 03 2010	1 year
23	*Position Controller	DAEIL EMC	N/A	N/A	N/A	N/A
24	*Turn Table	DAEIL EMC	N/A	N/A	N/A	N/A
25	*Antenna Mast	DAEIL EMC	N/A	N/A	N/A	N/A
26	*Anechoic Chamber	EM Eng.	N/A	N/A	N/A	N/A
27	*Shielded Room	EM Eng.	N/A	N/A	N/A	N/A
28	*Position Controller	Seo-Young EMC	N/A	N/A	N/A	N/A
29	*Turn Table	Seo-Young EMC	N/A	N/A	N/A	N/A
30	*Antenna Mast	Seo-Young EMC	N/A	N/A	N/A	N/A
31	*Anechoic Chamber	Seo-Young EMC	N/A	N/A	N/A	N/A
32	*Shielded Room	Seo-Young EMC	N/A	N/A	N/A	N/A

***)** Test equipment used during the test