

5. Maximum peak output power measurement

5.1. Test setup

5.1.1. 11a/b/g/n-H20



5.1.2. 11n-H40



5.2. Limit

According to §15.247(b)(3), for systems using digital modulation in the 902 ~ 928 MHz, 2 400 ~2 483.5 MHz, and 5 725 ~ 5 850 MHz band: 1 Watt. As an alternative to a peak power measurement, compliance with the one watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antenna elements. The average must not include any intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to §15.247(b)(4), the conducted output power limit specified in paragraph(b) of this section is based on the use of antenna with directional gains that do not exceed 6 dBi. Except as shown in paragraph(c) of this section, if transmitting antenna of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraph (b)(1), (b)(2), and (b)(3) of this section , as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.3. Test procedure

5.3.1. 11a/b/g/n-H20

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to power sensor

5.3.2. 11n-H40

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the Spectrum analyzer as RBW = 1 MHz, VBW ≥ 3 MHz, Span = 50 MHz, Channel BW = 26 dB BW.
4. Use peak detector mode and trace average 100 traces in power averaging mode.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

5.4. Test result

Ambient temperature : (24 ± 2) °C
Relative humidity : 49 % R.H.

5.4.1. 11a/b/g/n-H20

Operation Mode	Channel	Channel Frequency (MHz)	Attenuator + Cable offset (dB)	Peak Power Measured (dB m)	Peak Power Limit (dB m)
DSSS 802.11b	Low	2 412	11.25	17.73	30
	Middle	2 437	11.30	17.52	
	High	2 462	11.32	18.28	
OFDM 802.11g	Low	2 412	11.25	24.65	
	Middle	2 437	11.30	24.66	
	High	2 462	11.32	24.48	
OFDM 802.11n_HT20	Low	2 412	11.25	23.68	
	Middle	2 437	11.30	23.47	
	High	2 462	11.32	23.70	
OFDM 802.11a	Low	5 745	11.63	16.47	
	Middle	5 785	11.66	17.82	
	High	5 825	11.54	16.90	
OFDM 802.11n_HT20	Low	5 745	11.63	16.09	
	Middle	5 785	11.66	17.46	
	High	5 825	11.54	16.76	

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

5.4.2. 11n-H40

Operation Mode	Channel	Channel Frequency (MHz)	Attenuator + Cable offset (dB)	Peak Power Measured (dB m)	Peak Power Limit (dB m)
OFDM 802.11n_HT40	Low	5 755	8.39	9.67	30
	High	5 795	8.41	10.82	

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

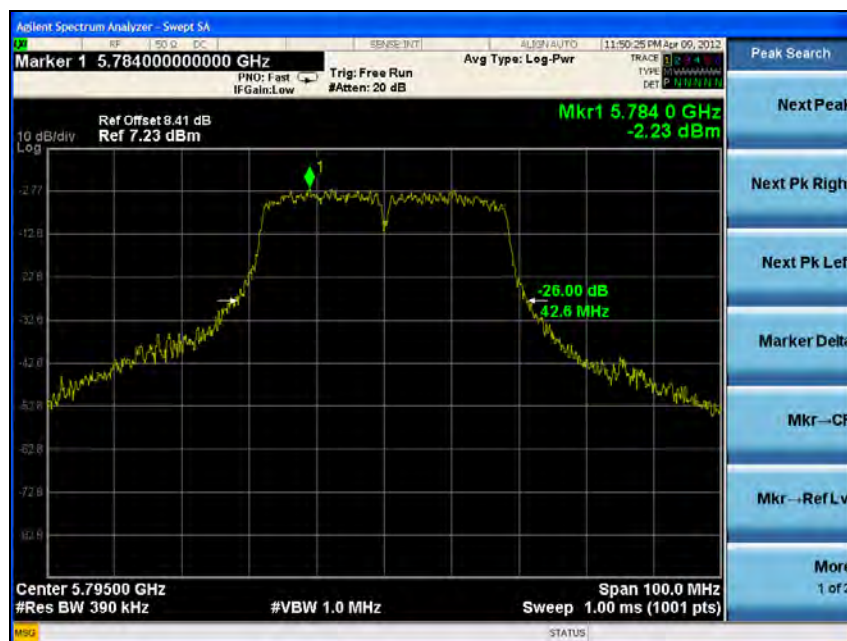
802.11n_HT40 26 dB Bandwidth and Peak Power

26 dB Bandwidth

5 755 MHz



5 795 MHz



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

Peak Power

5 755 MHz



5 795 MHz



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

6. Power spectral density measurement

6.1. Test setup



6.2. Limit

According to §15.247(e), For digitally modulated system, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph(b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density

6.3. Test procedure

1. Place the EUT on the table and set it in transmitting mode
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3 kHz, VBW = 10 kHz, Span = 300 kHz, Sweep = 100 s
3. Record the max reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

6.4. Test result

Ambient temperature : (24 ± 2) °C
Relative humidity : 49 % R.H.

Operation Mode	Frequency (MHz)	Final RF Power Level in 3 kHz BW (dB m)	Limit (dB m)
DSSS 802.11b	2 412	-10.68	8
	2 437	-10.47	
	2 462	-10.44	
OFDM 802.11g	2 412	-10.07	
	2 437	-11.36	
	2 462	-10.44	
OFDM 802.11n_HT20	2 412	-11.79	
	2 437	-11.68	
	2 462	-11.72	
OFDM 802.11a	5 745	-17.93	
	5 785	-17.59	
	5 825	-19.20	
OFDM 802.11n_HT20	5 745	-18.01	
	5 785	-16.99	
	5 825	-18.11	
OFDM 802.11n_HT40	5 755	-21.53	
	5 795	-19.64	

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

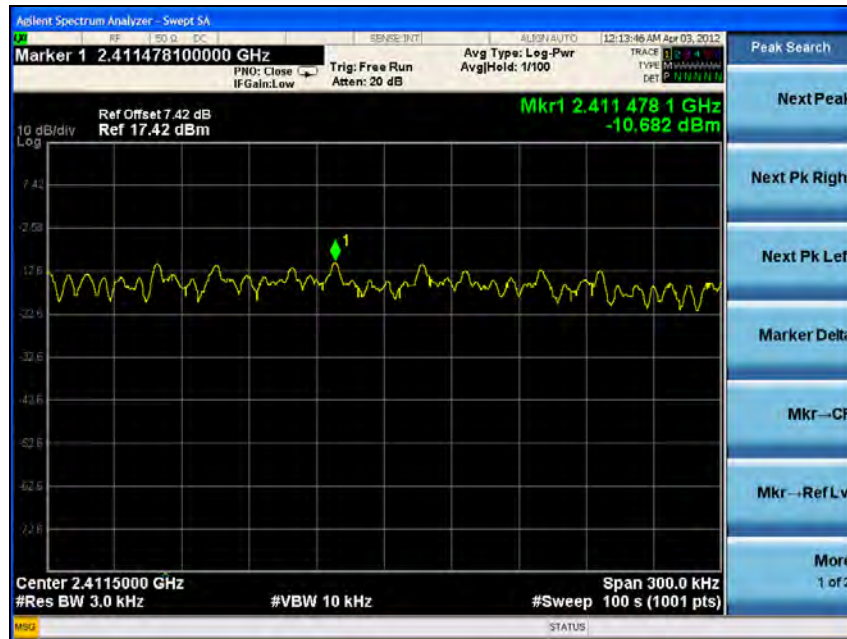
Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

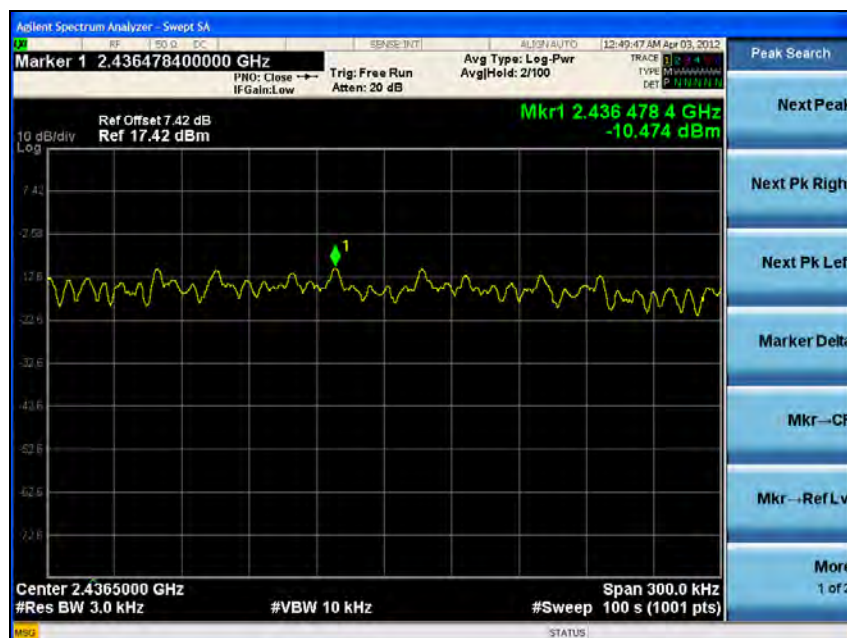
2.4 GHz

802.11b

Low channel



Middle channel



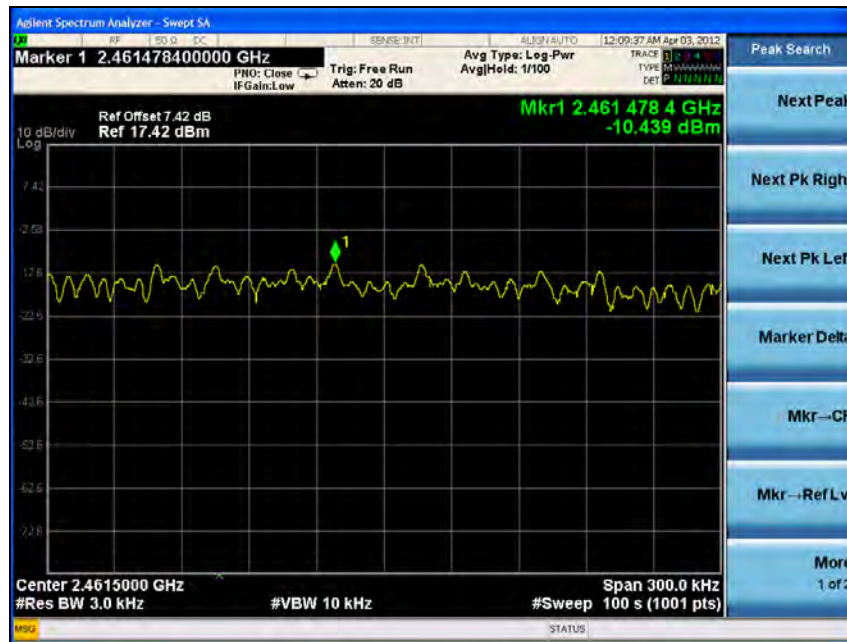
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

High channel



802.11g

Low channel



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

Middle channel



High channel



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

802.11n_HT20 Low channel



Middle channel



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

High channel



5.8GHz

802.11a

Low channel



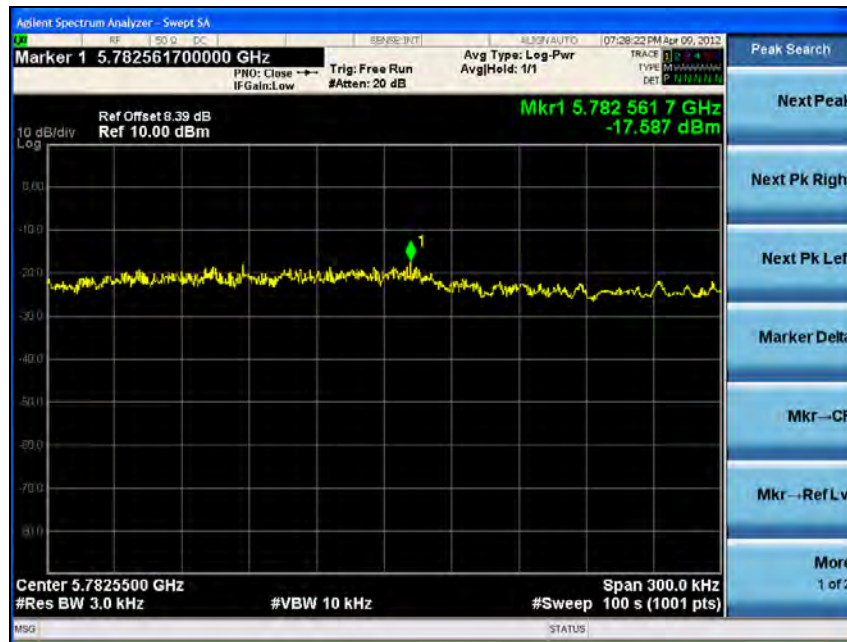
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

Middle channel



High channel



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

802.11n_HT20

Low channel



Middle channel



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

High channel



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

802.11n_HT40

Low channel



High channel



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

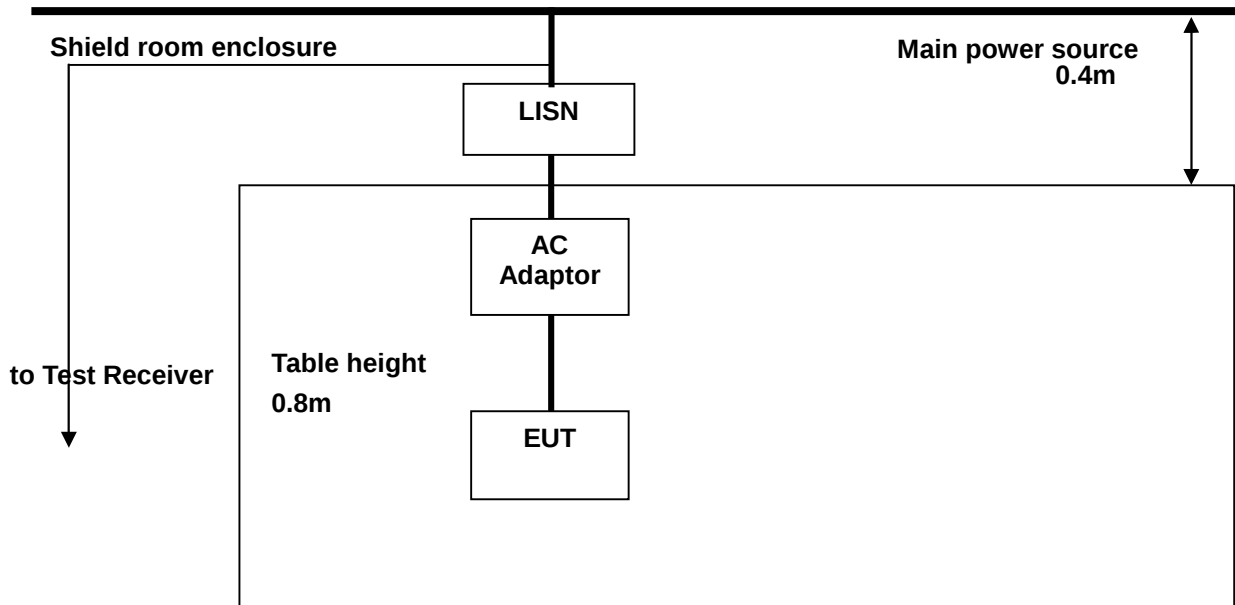
SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

7. Transmitter AC Power Line Conducted Emission

7.1. Test Setup



7.2. Limit

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 uH/50 ohm line impedance stabilization network(LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

* Decreases with the logarithm of the frequency.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

7.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

1. The test procedure is performed in a 6.5m × 3.6m × 3.6m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m(W) × 1.5 m(L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. The excess power cable between the EUT and the LISN was bundled. All connecting cables of EUT were moved to find the maximum emission.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

7.4. Test Results

7.4.1. TX mode(Worst case configuration_11g mode)

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

Ambient temperature : (24 ± 2) °C
Relative humidity : 47 % R.H.

Frequency range : 0.15 MHz – 30 MHz
Measured Bandwidth : 9 kHz

FREQ. (MHz)	LEVEL(dB μ V)		LINE	LIMIT(dB μ V)		MARGIN(dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.15	51.57	40.97	H	66.00	56.00	14.43	15.03
0.26	50.93	40.63	H	61.43	51.43	10.50	10.80
0.49	46.32	35.62	H	56.25	46.25	9.93	10.63
0.57	44.67	37.07	H	56.00	46.00	11.33	8.93
1.08	44.87	34.07	H	56.00	46.00	11.13	11.93
1.93	45.79	34.99	H	56.00	46.00	10.21	11.01
0.15	51.26	40.56	N	66.00	56.00	14.74	15.44
0.26	49.61	41.21	N	61.43	51.43	11.82	10.22
0.53	47.25	37.65	N	56.00	46.00	8.75	8.35
1.03	44.76	35.16	N	56.00	46.00	11.24	10.84
1.22	43.52	35.22	N	56.00	46.00	12.48	10.78
2.23	41.86	34.86	N	56.00	46.00	14.14	11.14

Note ;

Line (H) : Hot

Line (N) : Neutral

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

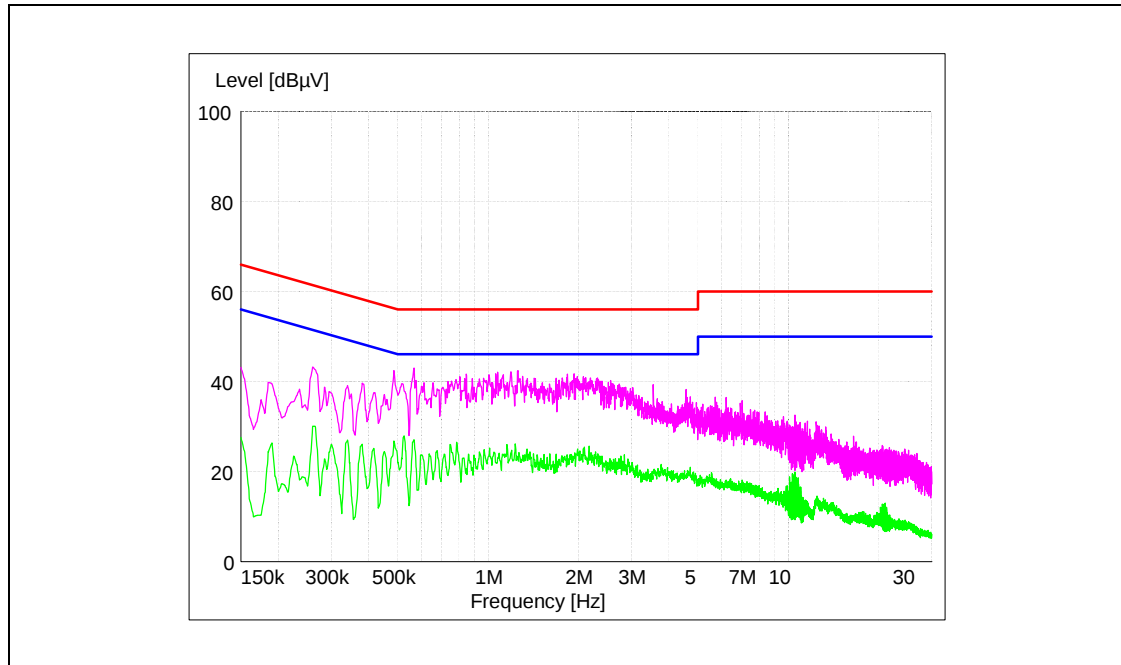
SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

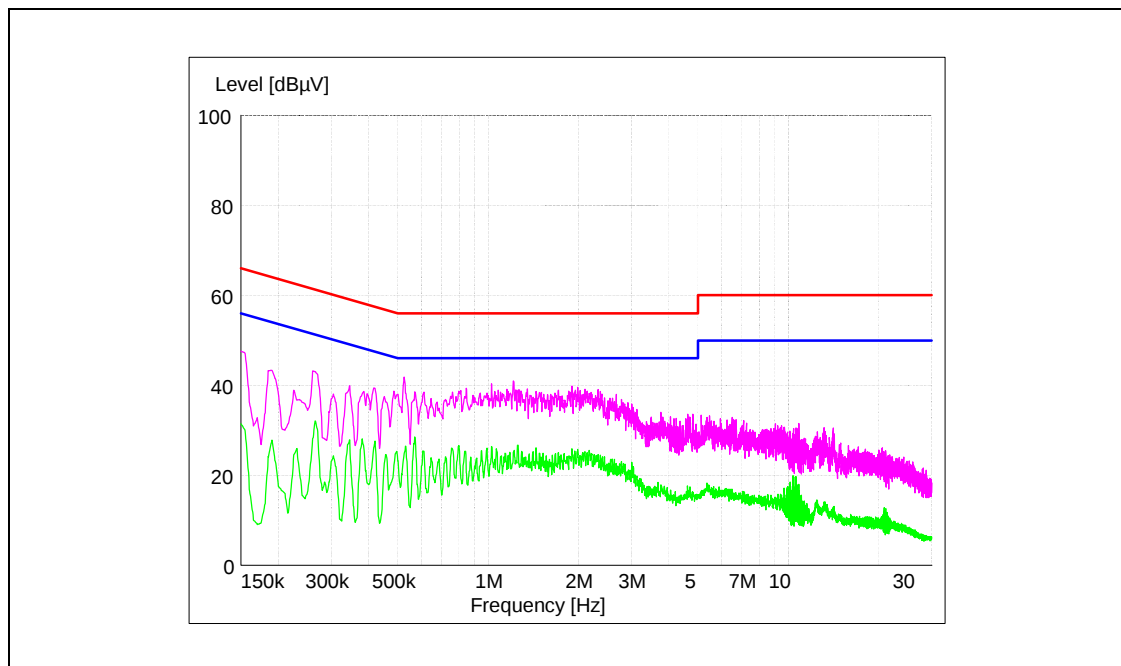
www.ee.sgs.com/korea

Plot of Conducted Power line

Test mode : (Hot)



Test mode : (Neutral)



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

7.4.2. RX mode

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

Ambient temperature : (24 ± 2) °C
Relative humidity : 47 % R.H.

Frequency range : 0.15 MHz – 30 MHz
Measured Bandwidth : 9 kHz

FREQ. (MHz)	LEVEL(dB μ V)		LINE	LIMIT(dB μ V)		MARGIN(dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.19	42.55	32.05	H	64.04	54.04	21.49	21.99
0.44	40.57	31.47	H	57.16	47.16	16.59	15.69
0.64	40.47	32.57	H	56.00	46.00	15.53	13.43
0.97	43.72	34.52	H	56.00	46.00	12.28	11.48
2.20	39.88	29.08	H	56.00	46.00	16.12	16.92
3.65	36.79	27.99	H	56.00	46.00	19.21	18.01
0.51	40.55	29.75	N	56.00	46.00	15.45	16.25
0.95	41.02	33.82	N	56.00	46.00	14.98	12.18
1.18	41.02	22.52	N	56.00	46.00	14.98	23.48
1.50	39.66	31.36	N	56.00	46.00	16.34	14.64
3.10	12.86	28.16	N	56.00	46.00	43.15	17.84
6.14	32.77	23.97	N	60.00	50.00	27.23	26.03

Note ;

Line (H) : Hot

Line (N) : Neutral

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

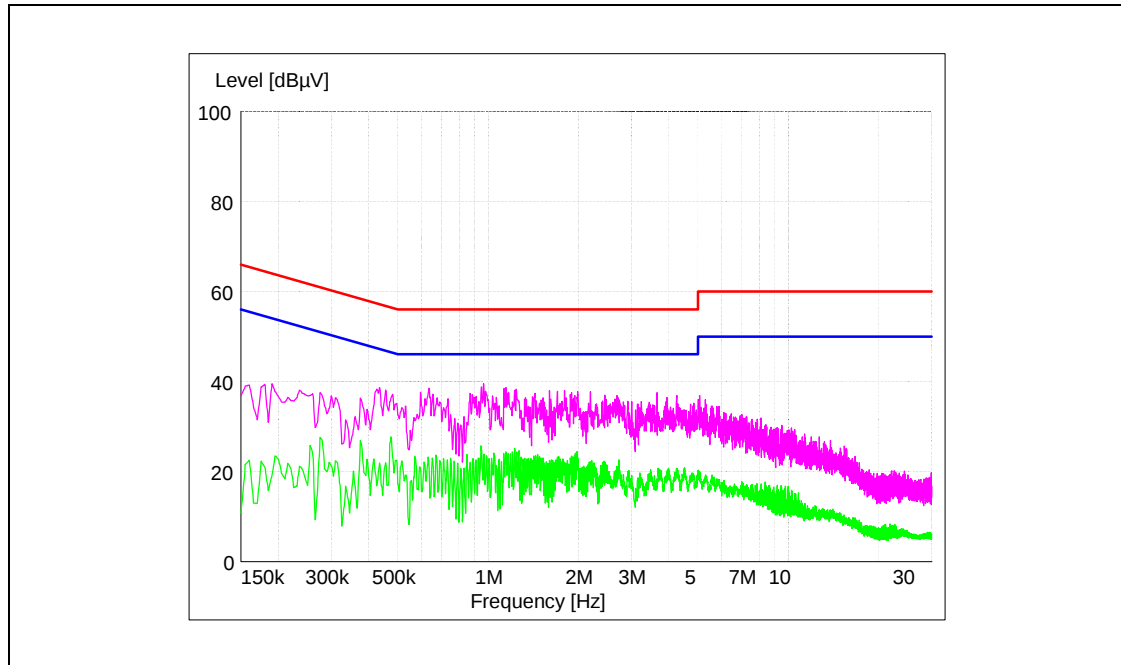
SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

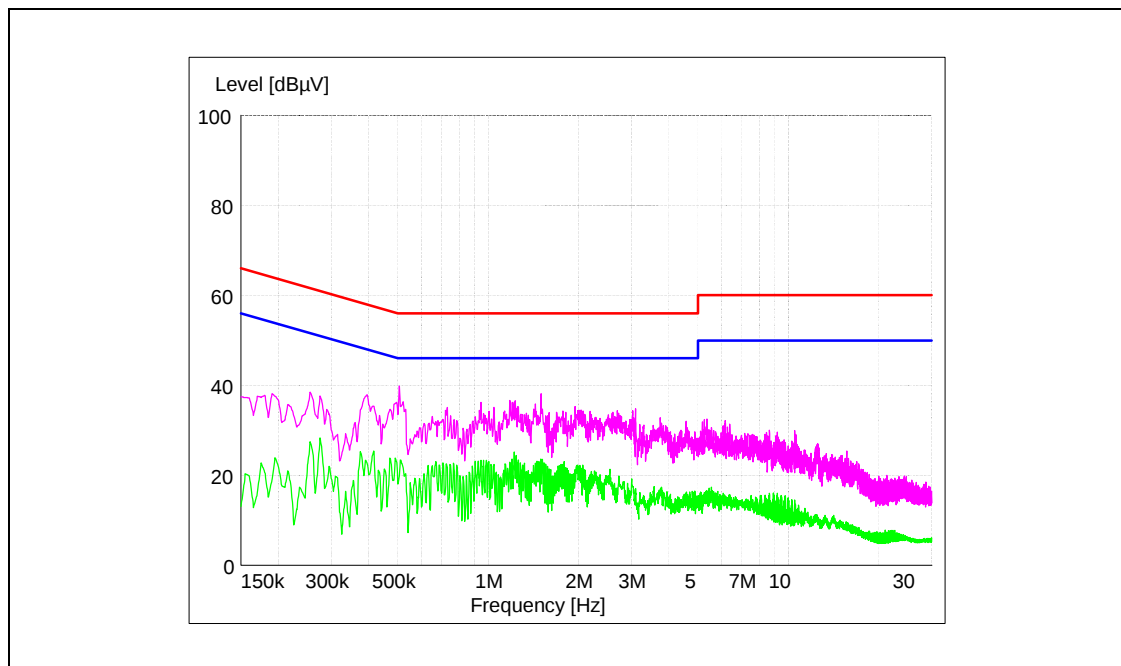
www.ee.sgs.com/korea

Plot of Conducted Power line

Test mode : (Hot)



Test mode : (Neutral)



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea

8. Antenna Requirement

8.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section §15.203, 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. And according to FCC 47 CFR Section § 15.247 (b), if transmitting antennas of directional gain greater than 6 dB i are used, the power shall be reduced by the amount in dB that the gain of the antenna exceeds 6 dB i.

8.2. Antenna Connected Construction

The antenna used of this product is the internal antenna and peak max gain of each antennas as below .

11b/g/n_HT20	11a/n_HT20, HT40	11a/n_HT20, HT40 – Non DFS
0.33 dB i	-6.40 dB i	0.38 dB i

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

Tel. +82 31 428 5700 / Fax. +82 31 427 2371

www.ee.sgs.com/korea