

Test report No.: KES-RF-16T0067 Page (1) of (62)

# **TEST REPORT**

# Part 15 Subpart C 15.247

Equipment under test HOME CAMERA

Model name SNH-V6430BN

FCC ID NLMSNHV6430BN

Applicant Hanwha Techwin Co., Ltd.

Manufacturer Tianjin Samsung Techwin Opto-Electronic Co., Ltd.

Date of test(s) 2016.07.14 ~ 2016.09.02

Date of issue 2016.09.07

Issued to Hanwha Techwin Co., Ltd.

1204, Changwon-daero, Seongsan-gu, Changwon-si, Gyeongsangnam-do, South Korea Tel: +82-70-7147-8361 / Fax: +82-31-8108-3717

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Test and report completed by :	Report approval by :
A	- And
Kwon-se Kim	Jeff Do
Test engineer	Technical manager

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## **Revision history**

Revision	Date of issue Test report No.		Description
-	2016.09.07	KES-RF-16T0067	Initial



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I. General Info	ormation
Applicant:	Hanwha Techwin Co., Ltd.
Applicant address:	1204, Changwon-daero, Seongsan-gu, Changwon-si,
	Gyeongsangnam-do, South Korea
Test site:	KES Co., Ltd.
Test site address:	C-3701, 40, Simin-daero 365beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, Kore
	473-29, Gayeo-ro, Yeoju-si, Gyeonggi-do, Korea
FCC rule part(s):	15.247
FCC ID:	NLMSNHV6430BN
Test device serial No.:	$\square$ Production $\square$ Pre-production $\square$ Engineering
1.1. EUT descrip	otion
Equipment under test	HOME CAMERA
Frequency range	2 412 MHz ~ 2 462 MHz (11b/g/n_HT20)
	$2 422 \text{ MHz} \sim 2 452 \text{ MHz} (11n_HT40)$
	UNII-1 5 180 $M_{\mathbb{Z}} \sim 5 240 M_{\mathbb{Z}}$ (11a/n_HT20, 11ac_VHT20)
	5 190 Mz ~ 5 230 Mz (11n_HT40, 11ac_VHT40)
	$5 210 \text{ Mz} (11ac_VHT80)$
	UNII-2A 5 260 Mz ~ 5 320 Mz (11 $a/n_HT20$ , 11 $ac_VHT20$ ) 5 270 Wz ~ 5 310 Wz (11 $n_HT20$ , 11 $ac_VHT20$ )
	5 270 MHz ~ 5 310 MHz (11n_HT40, 11ac_VHT40) 5 290 MHz (11ac VHT80)
	UNII-2C 5 500 Mz $\sim$ 5 720 Mz (11a/n HT20, 11ac VHT20)
	$5510 \text{ Mz} \sim 5710 \text{ Mz}$ (11n HT40, 11ac VHT40)
	$5530 \text{ Mz} \sim 5690 \text{ Mz}$ (11ac VHT80)
	UNII-3 5 745 Mz ~ 5 825 Mz (11 $a/n$ HT20, 11 $ac$ VHT20)
	5 755 MHz ~ 5 795 MHz (11n_HT40, 11ac_VHT40)
	5 775 Mz (11ac_VHT80)
Model:	SNH-V6430BN
Modulation technique	DSSS, OFDM
Number of channels	11 ch : 2 412 MHz ~ 2 462 MHz, 7 ch : 2 422 MHz ~ 2 452 MHz
	$4ch: 5\ 180\ MHz \sim 5\ 240\ MHz$ , $2ch: 5\ 190\ MHz \sim 5\ 230\ MHz$ , $1ch: 5\ 210\ MHz$
	$4ch: 5\ 260\ MHz \sim 5\ 320\ MHz, \ 2ch: 5\ 270\ MHz \sim 5\ 310\ MHz, \ 1ch: 5\ 290\ MHz$
	$12ch: 5500 \text{ MHz} \sim 5720 \text{ MHz},  6ch: 5510 \text{ MHz} \sim 5710 \text{ MHz},  3ch: 5530 \text{ MHz} \sim 5690 \text{ MHz}$
	5ch : 5 745 MHz ~ 5 825 MHz, 2ch : 5 755 MHz ~ 5795 MHz, 1ch : 5 775 MHz
Antenna specification	11b/g/n_HT20/40 : Chip antenna & 2.74 dBi
	UNII-1 : Chip antenna & 1.39 dBi
	UNII-2A : Chip antenna & 1.95 dBi
	UNII-2C : Chip antenna & 3.91 dBi
D	UNII-3 : Chip antenna & 3.39 dBi
Power source	AC 120V Adapter (Output : DC 5V / 2 A)

#### 1. General information

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### **1.2.** Test configuration

The <u>Hanwha Techwin Co., Ltd. HOME CAMERA FCC ID: NLMSNHV6430BN</u> was tested per the guidance of KDB 558074 D01 v03r05. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing

#### **1.3.** Device modifications

N/A

### **1.4.** Derivation model information

N/A

#### **1.5.** Frequency/channel operations

Ch.	Frequency (Mb)	Mode
01	2 412	802.11b/g/n_HT20
		-
06	2437	802.11b/g/n_HT20
· .		
11	2 462	802.11b/g/n_HT20

Ch.	Frequency (Mb)	Mode
03	2 422	802.11n_HT40
		-
06	2 437	802.11n_HT40
		-
09	2 452	802.11n_HT40

### 1.6. Maximum output power

Refer to the output power.

Note.

- 1. Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.
- Worst-case data rates were: 802.11b mode : <u>1Mbps</u> 802.11g mode : <u>6Mbps</u> 802.11n\_HT20 mode : <u>MCS0</u> 802.11n\_HT40 : <u>MCS0</u>



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2. Summary of to	ests	
Reference	Parameter	Test results
15.247(a)(2)	6 dB bandwidth	Pass
15.247(b)(3)	Peak output power	Pass
15.247(e)	Power spectral density	Pass
15.205 15.209	Radiated restricted band and emission	Pass
15.247(d)	Conducted spurious emission and band edge	Pass
15.207(a)	AC conducted emissions	Pass



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### 3. Test results

#### 3.1. 6 dB bandwidth

#### Test procedure

KDB 558074 D01 v03r05 - Section 8.1 or 8.2

#### Section 8.1

- 1. RBW = 100 kHz.
- 2. VBW  $\geq$  3  $\times$  RBW.
- 3. Detector = peak.
- 4. Trace mode = max hold.
- 5. Sweep = auto couple.
- 6. Allow the trace to stabilize
- 7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### Section 8.2

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz,  $VBW \ge 3 \times RBW$ , peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be  $\ge 6 \text{ dB}$ .

#### Limit

According to \$15.247(a)(2), systems using digital modulation techniques may operate  $902 \sim 928$  Mb,  $2400 \sim 2483.5$  Mb, and  $5725 \sim 5850$  Mb bands. The minimum 6 dB bandwidth shall be at least 500 kb.

Test Mode	Bandwidth(Mz)	Frequency(Mz)	6 dB bandwidth(Mb)	Limit(Mb)
		2 412	10.159	
802.11b	20	2 437	10.159	
		2 462	10.159	
		2 412	16.585	
802.11g	20	2 437	16.585	
		2 462	16.585	0.5
	20	2 412	17.757	0.3
802.11n		2 437	17.757	
		2 462	17.757	
		2 422		
802.11n	40	2 437	36.580	
		2 452	36.580	

### Test results

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#### 802.11b // Low channel



#### 802.11b // Middle channel

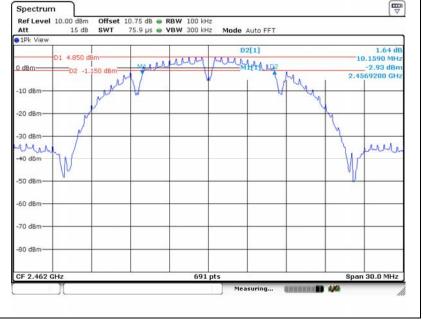


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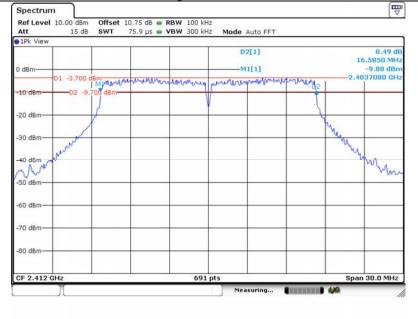


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#### 802.11b // High channel



#### 802.11g // Low channel



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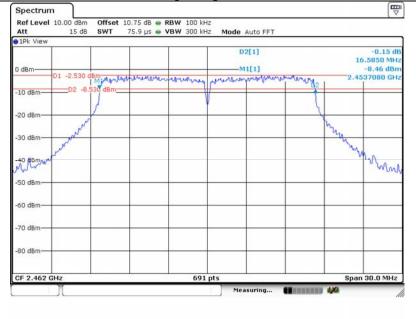


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#### 802.11g // Middle channel



#### 802.11g // High channel

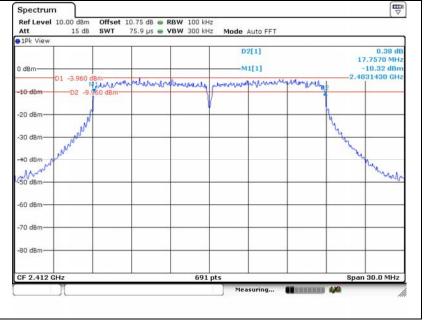


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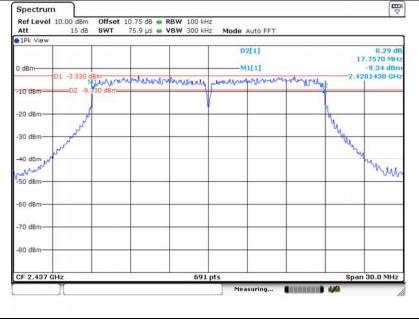


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#### 802.11n\_HT20 // Low channel



#### 802.11n\_HT20 // Middle channel

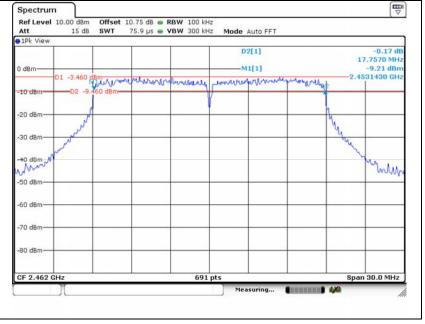


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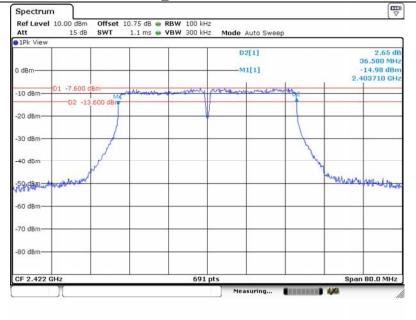


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#### 802.11n\_HT20 // High channel

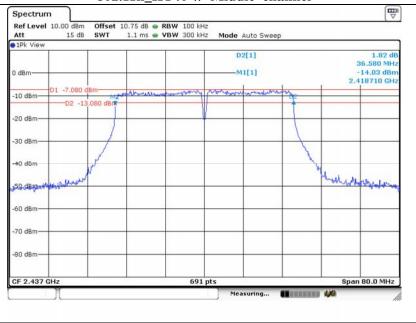


#### 802.11n\_HT40 // Low channel



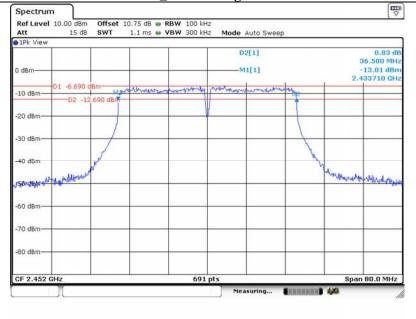
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### 802.11n\_HT40 // Middle channel

#### 802.11n\_HT40 // High channel



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# **3.2.** Peak output power

**Test procedure** KDB 558074 D01 v03r05 – section 9.1.1 or 9.1.2

#### Section 9.1.1

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is gr eater than the DTS bandwidth.

- 1. Set the RBW  $\geq$  DTS bandwidth.
- 2. Set VBW  $\geq$  3  $\times$  RBW.
- 3. Set span  $\geq$  3  $\times$  RBW
- 4. Sweep time = auto couple
- 5. Detector = peak
- 6. Trace mode = max hold
- 7. Allow trace to fully stabilize
- 8. Use peak marker function to determine the peak amplitude level

#### Section 9.1.2

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS ba ndwidth and shall utilize a fast-responding diode detector.

#### Limit

According to \$15.247(b)(3), For systems using digital modulation in the 902~928 Mz, 2 400~2 483.5 Mz, and 5 725~5 850 Mz bands: 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 out-put power. Maximum Conducted Out-put 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 antennas and antenna elements. The average must not include any time 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 antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmit-ting antennas 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 paragraphs (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 6 dBi.



Test results										
			Output power(dBm)							
Mode	Channel no.	Detector	Detector Data rate(Mbps)							
			1	2	5.5	11				
	01	РК	16.82	16.78	16.77	16.76				
		AV	14.33	14.30	14.28	14.26				
802.11b	06	РК	17.75	17.71	17.70	17.69				
802.110	06	AV	15.07	15.05	15.04	15.03				
	11	РК	18.22	18.21	18.19	18.19				
	11	AV	15.61	15.60	15.58	15.57				

					Output power(dBm)							
Mode	Channel no.	Detector	ctor Data rate(Mbps)									
			6	9	12	18	24	36	48	54		
	01	РК	20.93	20.92	20.92	20.91	20.90	20.91	20.92	20.90		
	01	AV	11.17	11.16	11.15	11.15	11.14	11.15	11.14	11.13		
<b>903 11</b> a	06	РК	21.51	21.50	21.49	21.49	21.49	21.48	21.49	21.48		
802.11g	06	AV	11.83	11.82	11.81	11.81	11.80	11.81	11.81	11.80		
	11	РК	21.68	21.67	21.67	21.67	21.66	21.66	21.66	21.65		
	11	AV	12.03	12.02	12.02	12.02	12.01	12.01	12.00	11.99		



			Output power(dBm)									
Mode	Channel no.	Detector	Detector Data rate(MCS)									
			0	1	2	3	4	5	6	7		
	01	РК	20.90	20.89	20.89	20.88	20.88	20.88	20.88	20.87		
	01	AV	11.12	11.11	11.11	11.11	11.10	11.11	11.11	11.11		
802.11n	06	РК	21.50	21.49	21.49	21.49	21.47	21.47	21.48	21.47		
(HT20)	06	AV	11.81	11.80	11.80	11.79	11.80	11.80	11.80	11.79		
	11	РК	21.65	21.64	21.64	21.63	21.63	21.64	21.63	21.63		
	11	AV	11.98	11.97	11.97	11.97	11.97	11.96	11.97	11.96		

			Output power(dBm)									
Mode	Channel no.	Detector	Data rate(MCS)									
			0	1	2	3	4	5	6	7		
	03	РК	19.59	19.54	19.47	19.48	19.44	19.46	19.43	19.44		
	03	AV	10.05	9.98	9.93	9.91	9.89	9.88	9.86	9.84		
802.11n	06	РК	20.89	20.83	20.83	20.86	20.87	20.86	20.85	20.84		
(HT40)	06	AV	10.80	10.78	10.76	10.75	10.74	10.73	10.72	10.71		
	00	РК	20.99	20.80	20.96	20.95	20.97	20.93	20.94	20.94		
	09	AV	10.88	10.87	10.87	10.87	10.86	10.85	10.84	10.84		



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**3.3.** Power spectral density Test procedure KDB 558074 D01 v03r05- section 10.2

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. Set the span to 1.5 times the DTS channel bandwidth.
- 3. Set the RBW : 3 kHz  $\leq$  RBW  $\leq$  100 kHz
- 4. Set the VBW  $\geq$  3  $\times$  RBW.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level.
- 10. If measured value exceeds limit, reduce RBW(no less than 3 kHz) and repeat.

#### Limit

According to \$15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during 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.



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Test results				
Test Mode	Bandwidth(Mb)	Frequency(Mbz)	PSD (dBm)	Limit(dBm)
		2 412	-17.05	
802.11b	20	2 437	-16.65	
		2 462	-16.08	
		2 412	-17.63	
802.11g	20	2 437	-17.36	
		2 462	-17.25	Q
	20	2 412	-17.95	8
802.11n		2 437	-17.31	
		2 462	-17.18	
		2 422	-19.55	
802.11n	40	2 437	-19.83	
		2 452	-18.35	



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#### 802.11b // Low channel



### 802.11b // Middle channel



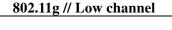
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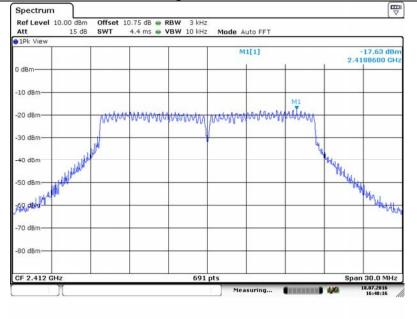


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#### 802.11b // High channel



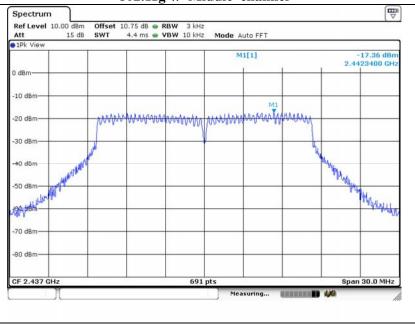




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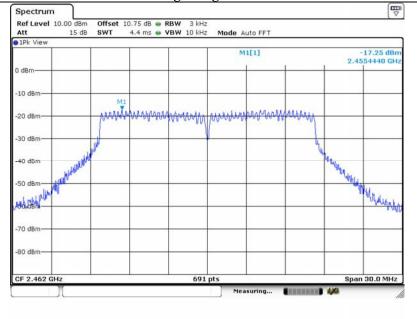


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#### 802.11g // Middle channel

#### 802.11g // High channel

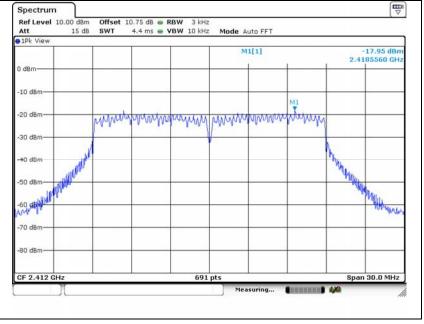


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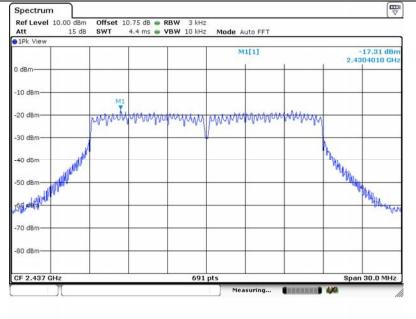


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#### 802.11n\_HT20 // Low channel



#### 802.11n\_HT20 // Middle channel

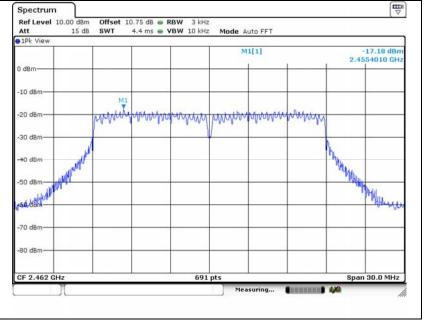


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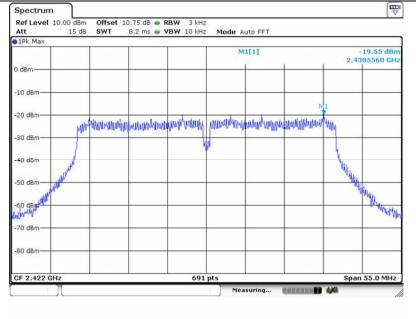


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#### 802.11n\_HT20 // High channel



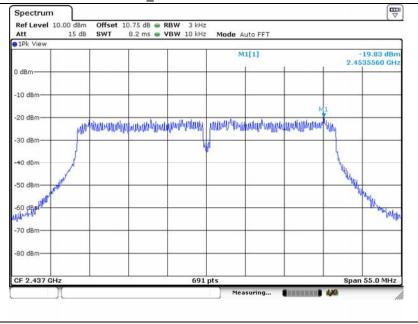
#### 802.11n\_HT40 // Low channel



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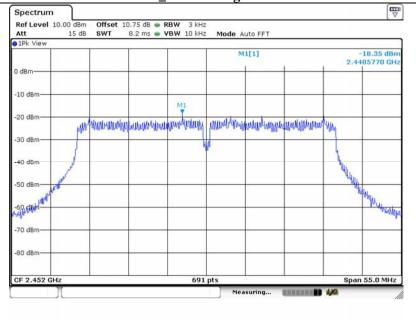


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#### 802.11n\_HT40 // Middle channel

#### 802.11n\_HT40 // High channel

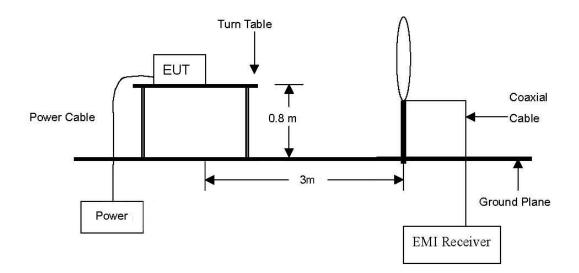




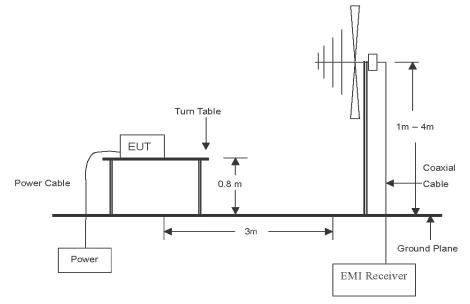
# 3.4. Radiated restricted band and emissions

#### Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions.

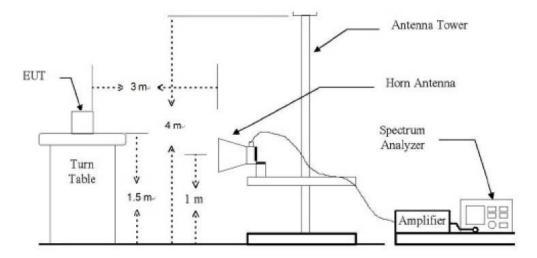


The diagram below shows the test setup that is utilized to make the measurements for emission from 30 Mz to 1 Gz emissions.





The diagram below shows the test setup that is utilized to make the measurements for emission from 1  $\mathbb{G}\mathbb{H}$  to the tenth harmonic of the highest fundamental frequency or to 40  $\mathbb{G}\mathbb{H}$  emissions, whichever is lower.



### Test procedure below 30 Mz

- 1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
- 3. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 4. The test-receiver system was set to average or quasi peak detect function and Specified Bandwidth with Maximum hold mode.

### Test procedure above 30 Mz

- 1. Spectrum analyzer settings for f < 1 GHz:
  - ① Span = wide enough to fully capture the emission being measured
  - ② RBW = 100 kHz
  - ③ VBW  $\ge$  RBW
  - ④ Detector = quasi peak
  - $\bigcirc$  Sweep time = auto
  - 6 Trace = max hold
- 2. Spectrum analyzer settings for  $f \ge 1$  GHz: Peak
  - ① Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
  - 2 RBW = 1 Mbz
  - ③ VBW  $\ge$  3 Mz
  - (4) Detector = peak
  - (5) Sweep time = auto
  - 6 Trace = max hold
  - $\bigcirc$  Trace was allowed to stabilize

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- 3. Spectrum analyzer settings for  $f \ge 1$  GHz: Average
  - ① Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
  - 2 RBW = 1 MHz

  - (4) Detector = RMS, if span/(# of points in sweep)  $\leq$  (RBW/2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
  - (5) Averaging type = power(i.e., RMS)
    - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
    - 2) Some instruments require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
  - 6 Sweep = auto
  - $\bigcirc$  Trace = max hold
  - 8 Perform a trace average of at least 100 traces.
  - (9) A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
    - 1) If power averaging (RMS) mode was used in step (5), then the applicable correction factor is  $10 \log(1/x)$ , where x is the duty cycle.
    - 2) If linear voltage averaging mode was used in step (5), then the applicable correction factor is 20 log(1/x), where x is the duty cycle.
    - 3) If a specific emission is demonstrated to be continuous ( $\geq 98$  percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

#### Note.

1. f < 30 MHz, extrapolation factor of 40 dB/decade of distance.  $F_d = 40\log(D_m/Ds)$ 

 $f \ge 30$  MHz, extrapolation factor of 20 dB/decade of distance.  $F_d = 20log(D_m/Ds)$  Where:

- $F_d$  = Distance factor in dB
- $D_m$  = Measurement distance in meters
- D<sub>s</sub> = Specification distance in meters
- 3.  $CF(Correction factors(dB)) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d(dB)$
- 4. Field strength( $dB\mu N/m$ ) = Level( $dB\mu N$ ) + CF (dB) + or DCF(dB)
- 5. Margin(dB) = Limit(dB $\mu$ N/m) Field strength(dB $\mu$ N/m)
- 6. Emissions below 18 GHz were measured at a 3 meter test distance while emissions above 18 GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z, it was determined that <u>Y orientation</u> was worst-case orientation; therefore, all final radiated testing was performed with the EUT in <u>Y orientation</u>.
- 8. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.

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### Limit

According to 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values :

Frequency (Mz)	Distance (Meters)	Radiated (µV/m)
0.009 ~ 0.490	300	2 400 / F(kHz)
0.490 ~ 1.705	30	24 000 / F(kHz)
1.705 ~ 30.0	30	30
30 ~ 88	3	100**
88~216	3	150**
216 ~ 960	3	200**
Above 960	3	500

\*\*Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands  $54 \sim 72$  Mb,  $76 \sim 88$  Mb,  $174 \sim 216$  Mb or  $470 \sim 806$  Mb. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

#### **Duty cycle**

Regarding to KDB 558074 D01\_v03r05, 6.0, the maximum duty cycles of all modes were investigated and set the spectrum analyzer as below.

Set RBW  $\geq$  OBW if possible; otherwise, set RBW to the largest available value. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100.

Test mode	T <sub>on</sub> time (ms)	Period (ms)	Duty cycle (Linear)	Duty cycle (%)	Duty cycle correction factor (dB)
802.11b	10.00	10.00	1	100	0
802.11g	10.00	10.00	1	100	0
802.11n(HT20)	10.00	10.00	1	100	0
802.11n(HT40)	10.00	10.00	1	100	0

#### Note

Duty cycle (Linear) =  $T_{on}$  time/Period

DCF(Duty cycle correction factor (dB)) = 10log(1/duty cycle)



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#### 802.11b // Middle channel

Att 35 dE 1Pk Clrw			085			
20 dBm						
10 dBm		 				_
0 dBm		 				
-10 dBm	_					
-20 dBm					-	
-30 dBm		 				
-40 dBm		 				-
-50 dBm		 				
-60 dBm		 				
CF 2.437 GHz		691		suring 🚺		1.0 ms/

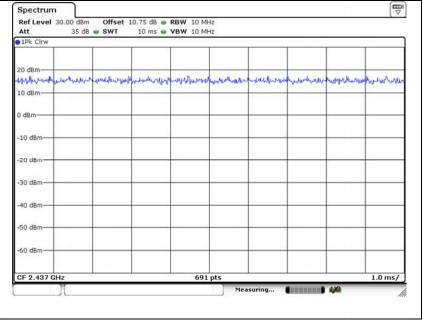
#### 802.11g // Middle channel

Att 1Pk Clrw	35 GB	SWT	10 ms 🖷	<b>VBW</b> 10 MH	12				
	-		( )			· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·
20 dBm Myllidyll	whitehall	whitehal	helichalited	herturkhertyrk	wahlungh	herrollier	hillsburked	helidhely	hatelurter
10 dBm									
0 dBm									
-10 dBm									
-20 dBm	2 <u>.</u>			-	/				
-30 dBm									
-40 dBm			e n						
-50 dBm						-			
-60 dBm									
CF 2.437 0	Hz			691	pts				1.0 ms/



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#### 802.11n\_HT20 // Middle channel



#### 802.11n\_HT40 // Middle channel

Att	35 dB	SWT	10 ms 🖷	VBW 10 MH	łz				
1PK CIrw			2						
20 dBm									
10 dBm	when but his	hohimment	multitum	pulled hashing	Wahrman	medude	Autorbuild	manne	united
0 dBm									
-10 dBm									
-20 dBm					-				
-30 dBm									
-40 dBm									
-50 dBm									
-60 dBm									
CF 2.437 (	GHz			691	pts				1.0 ms/
T	][				Mea	suring		4/0	1

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<b>Test results</b>	(Below 30	MHz)
---------------------	-----------	------

Mode:	802.11g
Transfer rate:	6 Mbps
Distance of measurement:	3 meter
Channel:	11(Worst case)
Chamier.	

Frequency	Level	Ant. Pol.	CF	Fd	Field strength	Limit	Margin
(MHz)	(dBµV)	(H/V)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
No spurious emissions were detected within 20dB of the limit							

Test results (Below 1 000 Mz)				
Mode:	802.11g			
Transfer rate:	6 Mbps			
Distance of measurement:	3 meter			
Channel:	11(Worst case)			

Frequency (Mz)	Level (dBµV)	Ant. Pol (H/V)	CF (dB)	Field strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
50.37	20.88	V	14.13	35.01	40.00	4.99
155.13	16.15	V	13.77	29.92	43.50	13.58
250.19	30.44	Н	12.96	43.40	46.00	2.60
283.17	24.07	Н	14.34	38.41	46.00	7.59
350.10	20.89	Н	16.06	36.95	46.00	9.05
550.89	19.35	Н	20.93	40.28	46.00	5.72



<b>Test results</b>	(Above	1 000	MHz)
---------------------	--------	-------	------

Mode:	802.11b
Transfer rate:	1 Mbps
Distance of measurement:	3 meter
Channel:	01

Frequency (MHz)	Level (dBµN)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBµV/m)	Limit (dBµN/m)	Margin (dB)
2389.84	50.02	Peak	Н	-9.77	-	40.25	74.00	33.75
2389.84	50.62	Peak	V	-9.77	-	40.85	74.00	33.15
5003.00	38.44	Peak	Н	-3.43	-	35.01	74.00	38.99
4988.00	39.82	Peak	V	-3.47	-	36.35	74.00	37.65

Mode:	802.11b
Transfer rate:	1 Mbps
Distance of measurement:	3 meter
Channel:	06

Frequency (Mz)	Level (dBµN)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBµN/m)	Limit (dBµN/m)	Margin (dB)
4994.00	38.33	Peak	Н	-3.45	-	34.88	74.00	39.12
5003.00	39.66	Peak	V	-3.43	-	36.23	74.00	37.77

Mode:	802.11b
Transfer rate:	1 Mbps
Distance of measurement:	3 meter
Channel:	11

Frequency (Mz)	Level (dBµV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBµN/m)	Limit (dBµN/m)	Margin (dB)
2492.47	51.31	Peak	Н	-9.37	-	41.94	74.00	32.06
2488.65	52.59	Peak	V	-9.39	-	43.20	74.00	30.80
4988.00	38.04	Peak	Н	-3.47	-	34.57	74.00	39.43
5003.00	39.30	Peak	V	-3.43	-	35.87	74.00	38.13



Mode:	802.11g
Transfer rate:	6 Mbps
Distance of measurement:	3 meter
Channel:	01

Frequency (MLz)	Level (dBµN)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBµV/m)	Limit (dBµN/m)	Margin (dB)
2389.20	52.09	Peak	Н	-9.77	-	42.32	74.00	31.68
2389.52	55.56	Peak	V	-9.77	-	45.79	74.00	28.21
4981.00	37.34	Peak	Н	-3.50	-	33.84	74.00	40.16
4993.00	38.67	Peak	V	-3.45	-	35.22	74.00	38.78

Mode:	802.11g
Transfer rate:	6 Mbps
Distance of measurement:	3 meter
Channel:	06

Frequency (MLz)	Level (dBµV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBµN/m)	Limit (dBµN/m)	Margin (dB)
4865.00	37.23	Peak	Н	-3.90	-	33.33	74.00	40.67
4990.00	39.93	Peak	V	-3.46	-	36.47	74.00	37.53

Mode:	802.11g
Transfer rate:	6 Mbps
Distance of measurement:	3 meter
Channel:	11

Frequency (Mz)	Level (dBµN)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBµN/m)	Limit (dBµN/m)	Margin (dB)
2490.04	50.89	Peak	Н	-9.38	-	41.51	74.00	32.49
2492.65	54.03	Peak	V	-9.37	-	44.66	74.00	29.34
4993.00	37.57	Peak	Н	-3.45	-	34.12	74.00	39.88
4993.00	40.54	Peak	V	-3.45	-	37.09	74.00	36.91



Mode:	802.11n(HT20)
Transfer rate:	MCS0
Distance of measurement:	3 meter
Channel:	01

Frequency (Mbz)	Level (dBµN)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBµN/m)	Limit (dBµN/m)	Margin (dB)
2389.04	51.52	Peak	Н	-9.77	-	41.75	74.00	32.25
2388.57	52.81	Peak	V	-9.77	-	43.04	74.00	30.96
4993.00	38.23	Peak	Н	-3.45	-	34.78	74.00	39.22
4993.00	39.34	Peak	V	-3.45	-	35.89	74.00	38.11

Mode:	802.11n(HT20)
Transfer rate:	MCS0
Distance of measurement:	3 meter
Channel:	06

Frequency (Mbz)	Level (dBµV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBµN/m)	Limit (dBµN/m)	Margin (dB)
4990.00	37.34	Peak	Н	-3.46	-	33.88	74.00	40.12
4990.00	39.22	Peak	V	-3.46	-	35.76	74.00	38.24

Mode:	802.11n(HT20)
Transfer rate:	MCS0
Distance of measurement:	3 meter
Channel:	11

Frequency (Mbz)	Level (dBµN)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBµN/m)	Limit (dBµN/m)	Margin (dB)
2484.28	51.30	Peak	Н	-9.40	-	41.90	74.00	32.10
2491.43	53.79	Peak	V	-9.37	-	44.42	74.00	29.58
4993.00	38.00	Peak	Н	-3.45	-	34.55	74.00	39.45
4993.00	40.05	Peak	V	-3.45	-	36.60	74.00	37.40



Mode:	802.11n(HT40)
Transfer rate:	MCS0
Distance of measurement:	3 meter
Channel:	03

Frequency (MHz)	Level (dBµV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBµN/m)	Limit (dBµN/m)	Margin (dB)
2382.80	52.24	Peak	Н	-9.79	-	42.45	74.00	31.55
2389.02	53.20	Peak	V	-9.77	-	43.43	74.00	30.57
4993.00	37.82	Peak	Н	-3.45	-	34.37	74.00	39.63
4981.00	39.46	Peak	V	-3.50	-	35.96	74.00	38.04

Mode:	802.11n(HT40)
Transfer rate:	MCS0
Distance of measurement:	3 meter
Channel:	06

Frequency (Mbz)	Level (dBµN)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBµN/m)	Limit (dBµN/m)	Margin (dB)
4839.00	37.40	Peak	Н	-3.99	-	33.41	74.00	40.59
4981.00	39.67	Peak	V	-3.50	-	36.17	74.00	37.83

Mode:	802.11n(HT40)
Transfer rate:	MCS0
Distance of measurement:	3 meter
Channel:	09

Frequency (MLz)	Level (dBµV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBµN/m)	Limit (dBµN/m)	Margin (dB)
2491.03	51.81	Peak	Н	-9.38	-	42.43	74.00	31.57
2489.06	52.89	Peak	V	-9.38	-	43.51	74.00	30.49
4981.00	38.05	Peak	Н	-3.50	-	34.55	74.00	39.45
4981.00	40.93	Peak	V	-3.50	-	37.43	74.00	36.57



# Test plots (Worst case)

Mode:	802.11b
Transfer rate:	1 Mbps
Distance of measurement:	3 meter
Channel:	01
Detected mode:	Peak, Hor

Ref Level 107.	OD dBuV		ectrum 3 ( W 1 MHz					
Att		15.1 µs 👄 VB		e Auto FFT				
1Pk Max				2010/01			1007.00	
100 dBµV				M1[1]		50.02 dBµV 2.389840 GHz		
90 dBµV						ſ	m	
80 dBµV								
70 dBµV								
60 dBµV								
50 dBuy	m	mm	mun	man	mand		-	
40 dBµV					-			
30 dBµV	_					v 15		
20 dBµV								
10 dBµV		-			F1	-		
Start 2.31 GHz			691 pts	502		Stop	2.42 GHz	
T I				Measuring	-	444		

#### Detected mode:

Peak, Ver

Spectrum	Spectrum		ectrum 3	×					
Ref Level 107.0 Att		<ul> <li>RE</li> <li>15.1 μs</li> <li>VE</li> </ul>	W 1 MHz W 3 MHz	Mode Au	to FFT				
1Pk Max	22					1.75		11-11-11-11-1	
100 dBµV				M	1[1]		50.62 dBµ/ 2.389840 GH		
90 dBµV								1	
80 dBµV									
70 dBµV									
60 dBµV									
50 deuv	mont	mun	m	mm	num	Nº NO			
40 dBµV									
30 dBµV									
20 dBµV									
10 dBµV						F1			
Start 2.31 GHz		10. 61	691		_	_		2.42 GHz	
Л_				Mea	suring		444	1	

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Mode:	802.11b
Transfer rate:	1 Mbps
Distance of measurement:	3 meter
Channel:	11
Detected mode:	Peak, Hor

Att	20 dB <b>SW</b>	T 5.7 µs 🖷 V	BW 3 MHz	Mode Auto	FFT			
1Pk Max			_					
				M	1[1]			51.31 dBpV 924730 GHz
100 dBµV	~					1 I	2.1	
90 dBµV	~							
90 GBHA-								
80 dBµV		-						
70 dBµV-								
		A						
60 dBµV								
			~	$\sim$		N.	11	
50 dBµV		-		~~~~	~~~~	mar	Server a	
40 dBµV								
30 dBµV			-					
30 0000								
20 dBuV-		_	_					
10 dBµV		_		F1				
Start 2.46 GHz		100	691	pts	ί¢		St	op 2.5 GHz
				Mea	suring	(insertion)	444	

## Detected mode:

Peak, Ver

Att	20 dB <b>SV</b>	/T 5.7 µs 🖷 '	VBW 3 MHz	Mode Auto	FFT			
1Pk Мах 100 dвµу				M	1[1]			52.59 dBµV 186520 GHz
90 dBµV	Z							
80 dBµV				·		-		
70 dBµV		$\rightarrow$						
60 dBµV		1	-			M1		
50 dBµV					~~~	- market	~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
40 dBµV			-					
30 dBµV								
20 dBµV								
10 dBµV				F1				
Start 2.46 GHz			691	pts	12 1		the second s	p 2.5 GHz



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Mode:	802.11g
Transfer rate:	6 Mbps
Distance of measurement:	3 meter
Channel:	01
Detected mode:	Peak, Hor

1Pk Max	22					1000 CONTRACTOR		
100 dBµV				M1[1]	1	52.09 dBµV 2.389200 GHz		
90 dBµV						m		
во dвµv								
70 dBµV								
50 dBµV					mant			
50 dBHY	m	mount	mm		Xm			
40 dBµV								
30 dBµV								
20 dBµV								
10 dBµV					F1			
Start 2.31 GHz		12 N.	691 pts	10		Stop 2.42 GHz		

## Detected mode:

Peak, Ver

1Pk Max		15.1 µs 🖷 VB		Mode Auto F					
100 dBµV				M1[1	1	Ť	55.56 dBµV 2.389520 GHz		
90 dBµV							1	~	
80 dBµV									
70 dBµV		-							
60 dBµV					M	int			
50 dBux	monto	mmm	mm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~ V	-No -			
40 dBµV									
30 dBµV									
20 dBµV									
10 dBµV					F	1			
Start 2.31 GH	2	- 68°	691 p	ts				42 GHz	



Mode:	802.11g
Transfer rate:	6 Mbps
Distance of measurement:	3 meter
Channel:	11
Detected mode:	Peak, Hor

1Pk Max			BW 3 MHz N	Node Auto FFT			
100 dBµV	-			M1[1]	1 1	50.89 dBµ\ 2.4900410 GH;	
90 dBµV							
80 dBµV							
70 dBµV							
60 dBµV			h		M1		
50 dBµV				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
40 dBµV							
30 dBµV						17	
20 dBµV							
10 dBµV			-	F1			
Start 2.46 GH	z	3.25	691 p	ots		Stop 2.5 GHz	

## Detected mode:

Peak, Ver

1Pk Max		5.7 µs 🖷 VB		Todo Hate				
100 dBµV		-		M	1[1]	1		54.03 dBµV 26460 GHz
90 dBµV-	/							
80 dBµV								
70 dBµV								
60 dBµV	24		m				M1	
50 dBµV		-	h	~~~			m	m
40 dBµV								
30 dBµV								
20 dBµV		-					-	
10 dBµV	_			F1				
Start 2.46 GHz			691		suring			op 2.5 GHz



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Mode:	802.11n(HT20)
Transfer rate:	MCS0
Distance of measurement:	3 meter
Channel:	01
Detected mode:	Peak, Hor

1Pk Max	22	- 10 - E - 10 -				
100 dBµV				M1[1]		51.52 dBµV 2.389040 GHz
90 dBµV				_		m
80 dBµV				-		
70 dBµV						
60 dBµV				-		
50 deux	- more	mm	mm		Xur	
40 dBµV						
30 dBµV						
20 dBµV						
10 dBµV	-	-			F1	

## Detected mode:

Peak, Ver

1Pk Max						100			
100 dBµV				M	1[1]	1	52.81 dB 2.388570 G		
90 dBµV								m.	
80 dBµV									
70 dBµV									
60 dBµV						M1			
59. ABUY	min	am	min	hand	man	John			
40 dBµV									
30 dBµV							<u>, ,</u>		
20 dBµV		-							
10 dBµV						F1			
Start 2.31 GHz		3.5	691		suring	COLUMN 2		o 2.42 GHz	



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Dongan-gu, Anyang-si, Gyeonggi-do, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Mode:	802.11n(HT20)
Transfer rate:	MCS0
Distance of measurement:	3 meter
Channel:	11
Detected mode:	Peak, Hor

Att	00 dBµV 20 dB <b>SWT</b> 5.7 µ	BW 1 MHz BW 3 MHz	Mode Auto FFT	
100 dBµV	M1[1]		51.30 dBµV 2.4842840 GHz	
90 dBµV				
80 dBµV				
70 dBµV				
60 dBµV			611	
50 dBµV		~~~		
40 dBµV				
30 dBµV				
20 dBµV				
10 dBµV			F1	
CF 2.48 GHz		691		Span 40.0 MHz

## Detected mode:

Peak, Ver

1Pk Max	121							
100 dBµV					1[1]	1 1		3.79 dBµV 14310 GHz
90 dBµV-								
80 dBµV								
70 dBµV		1						
60 dBµV						MI		
50 dBµV		-			$\sim$	~~		~~~~
40 dBµV								
30 dBµV		-						
20 dBµV								
10 dBµV		_	-	F1				
Start 2.46 GHz			691 p	ots	W	· · ·	Sto	p 2.5 GHz



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www.kes.co.kr

Mode:	802.11n(HT40)
Transfer rate:	MCS0
Distance of measurement:	3 meter
Channel:	03
Detected mode:	Peak, Hor

1Pk Max				(1) I.u.			
100 dBµV		2	M1[1]	1 1	52.24 dBµV 2.382800 GHz		
90 dBµV					m		
BO dBµV							
70 dBµV							
50 dBµV				M1			
59. ABHY	mand	mon	www.	Annon			
40 dBµV							
30 dBµV		y					
20 dBµV							
10 dBµV				F1			

## Detected mode:

Peak, Ver

1Pk Max		r 15.1 µs 👄		Mode Aut		1.1			
100 dBµV			8	M1[1]			53.20 dBµV 2.389020 GH;		
90 dBµV							m	m	
80 dBµV						/			
70 dBµV								,	
60 dBµV					M	01			
5adper m	mm	warman	m		eman	~~~~			
40 dBµV									
30 dBµV			-				-		
20 dBµV									
10 dBµV			-		F	1			
Start 2.31 GH		12	691	pts	50 - 33	in an	Stop 2.42	3 GHz	



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Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Mode:	802.11n(HT40)
Transfer rate:	MCS0
Distance of measurement:	3 meter
Channel:	09
Detected mode:	Peak, Hor

Att 1Pk Max	20 dB SWT	5.7 µs 🖷 🕶	and a minit in	IOUE AUTO FI	E.I.			
100 dBµV			M1[1]		2.	51.81 dBµV 2.4910250 GHz		
90-dBpv	-							
80 dBµV						_		
70 dBµV		1						
60 dBµV						M1		
50 dBµV			h		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		m	
40 dBµV								
30 dBµV								
20 dBµV								
10 dBµV		-		F1				
CF 2.48 GHz			691 p	ts		Spe	an 40.0 MHz	

## Detected mode:

Peak, Ver

Att 1Pk Max	20 08 SW	5.7 µs 🖷 ۷	BW 3 MHz M	ode Auto FF			
100 dBµV				M1[1]	1		2.89 dBµV 00570 GHz
90 dBpV	m	_					
80 dBµV				-			
70 dBµV		~					
60 dBµV					M1		
50 dBµV		-	h		~ tom		m
40 dBµV							
30 dBµV						· · · ·	
20 dBµV							
10 dBµV				F1			
CF 2.48 GHz			691 p	Measuri	ng		40.0 MHz



# 3.5 Conducted spurious emissions & band edge Test procedure

## Band edge

KDB 558074 D01 v03r05 - Section 11.3

- 1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
- 2. Span was set large enough so as to capture all out of band emissions near the band edge
- 3. RBW = 100 kHz
- 4. VBW = 300 kHz
- 5. Detector = Peak
- 6. Number of sweep points  $\geq 2 \times \text{Span/RBW}$
- 7. Trace mode = max hold
- 8. Sweep time = auto
- 9. The trace was allowed to stabilize

## Out of band emissions

KDB 558074 D01 v03r05 - Section 11.3

- 1. Start frequency was set to 30 MHz and stop frequency was set to 25 GHz for 2.4 GHz frequencies and 40 GHz for 5 GHz frequencies (separated into two plots per channel)
  - 2. RBW = 100 kHz
  - 3. VBW = 300 kHz
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

## Limit

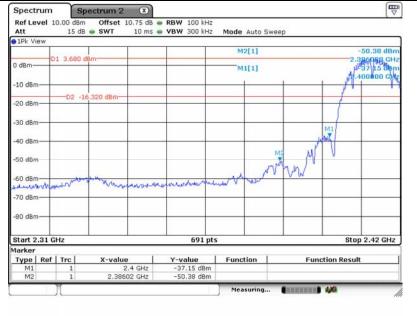
According to 15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph(b)(3) of this section , the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in section 15.209(a) is not required. In addition, radiated emission which in the restricted band, as define in section 15.205(a), must also comply the radiated emission limits specified in section 15.209(a) (see section 15.205(c))



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## Test results

## 802.11b // Low channel



Ref Level 10	00 dBm	Offset 10	.75 dB 😐	RBW 100 ki	Hz				
Att	15 dB	SWT 3	250 ms 🖷	VBW 300 k	Hz Mode	Auto Sweep			
1Pk View	22			2					
					M	1[1]			49.57 dBm
D1	3.150 dBm					1	1	1	4.8180 GH;
0 dBm									
-10 dBm									
	-D2 -16.8	50 dBm				-			
-20 dBm								-	
-30 dBm					-			-	
-40 dBm									
	Ma								
-50 dBm-	<b>T</b>			-				-	
-60 dBm	mande	mart		-				-	-
hedorenant be	manne		wanter	Melenmalle	and the man	man Allan	uninut	muliture	Munulle
-70 dBm-					COMMUNICATION OF				1015-000009-05
-80 dBm									
Start 30.0 MH	z			691	pts	207		Stop	25.0 GHz
					Mea	suring		4,40	

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Test report No .: KES-RF-16T0067 Page (46) of (62)

## 802.11b // Middle channel

1Pk View	1								
					M	1[1]			-50.40 dBm
0 dBm	D1 3.390 d	3m				-		-	4.8900 GHz
-10 dBm									
00.40-	D2 -16	.610 dBm							
-20 dBm									
-30 dBm—									
40 dBm									
-50 dBm	M								
-60 dBm	temphonent	www	www.	lun un	1 to Mar Al	were the	mediane	Meh working	northe articles
-70 dBm—		in.	- Marina ha	and the second	al as as a				
-80 dBm									
Start 30.0	MHz			691	ots	SV - 5		Sto	p 25.0 GHz



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## 802.11b // High channel



Att	15 dB	SWT	250 ms 🖷 '	VBW 300 kH	z Mode	Auto Sweep			
1Pk View	D1 4.040 dB				м	1[1]			49.89 dBm
0 dBm	101 4.040 00	sin							1.9200 GH2
-10 dBm								is to	
-20 dBm	D2 -15	.960 dBm							
-30 dBm									
-40 dBm									
-50 dBm	M		-						
-60 dBm	mouran	metally	Manaham	noun	union	ubnan	munit	Wouder a Male wille	Monortan
-70 dBm									
-80 dBm									
Start 30.0	MHz			691	pts			Stop	25.0 GHz

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## 802.11g // Low channel



Att 1Pk View	15 dB	SWT		/BW 300 kH	- mouo	Auto Sweep			
					м	1[1]			57.88 dBm 5.9500 GHz
0 dBm	D1 -3.790 d	8m-							-
-10 dBm-									
-20 dBm		.790 dBm							
-30 dBm—	02 -23	17 AO ODIN							
-40 dBm									
-50 dBm									-
-60 dBm-	Veronataentat	www.wh	ماريور).	mound	munut	moun	routines	www.	enwanne
-70 dBm—									
-80 dBm—									
Start 30.0	) MHz			691	pts		CHINESE CONTRACT		25.0 GHz

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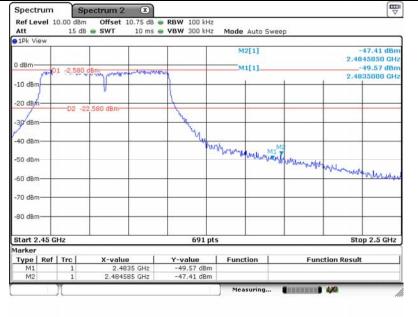
## 802.11g // Middle channel

RBW 100 kHz     WDW 300 kHz     Mode Auto Sweep      M1[1]	-59.18 dBm
M1[1]	
M1[1]	-58.18 dBm 6.8420 GHz
	0.0420 GHz
in much many and the second	monthemanina
691 pts	Stop 25.0 GHz
Measuring 🚺	



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## 802.11g // High channel



1Pk View						1000				
					M	1[1]		-58.46 dBm 6.1190 GHz		
0 dBm	D1 -2.940 dB	m								
-10 dBm—										
-20 dBm	D2 -22.9	40 dBm								
-30 dBm—		Ho dom								
-40 dBm										
-50 dBm										
-60 dBm-	Lunamorte	MI MI	where	munu	munn	urm	remains	Mr. yunskularis	when which	
-70 dBm—	+ +									
-80 dBm—										
Start 30.0	) MHz			691	pts			Stop	25.0 GHz	

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## 802.11n\_HT20 // Low channel



1Pk View						
			M1[1]		-59.56 dBm 16.2370 GHz	
0 dBm			+ +		1	
-10 dBm						
-20 dBm						
-30 dBm	0					
-40 dBm						
-50 dBm						
-60 dBm	M	and a straight	MI Harringhan	1. March da rat day	water and	
-70 dBm-	low water water			affine after a		
-80 dBm						
Start 30.0 MHz		691 pts		st	op 25.0 GHz	

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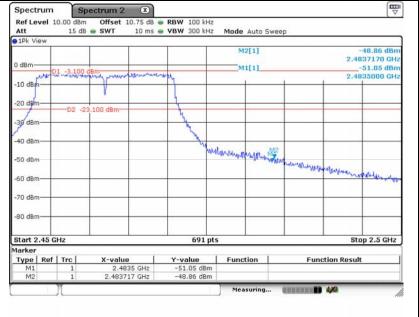
## 802.11n\_HT20 // Middle channel

	vel 10.00 dBm Offset 10.75 dB  RBW				100 kHz				
Ref Level 1 Att	0.00 dBm 15 dB	Offset SWT		RBW 100 VBW 300		Auto Swee	0		
1Pk View	10 00	Uni	200 110 -	1011 000	ATTE HOUS	Auto Swee	P		
					M	1[1]			59.17 dBm 626.0 MHz
0 dBm	-4.510 dB	m							
-10 dBm								5	
-20 dBm			-						
-30 dBm	-D2 -24.5	510 dBm-							
-40 dBm									
-50 dBm									
6D dBm	www.uum	mary	monute	Annahar	mayander	mark	manne	raccorden	Inerar
-70 dBm	-								
-80 dBm									
Start 30.0 MH	łz			69	1 pts				25.0 GHz
					Mea	suring		4,964	1



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## 802.11n\_HT20 // High channel



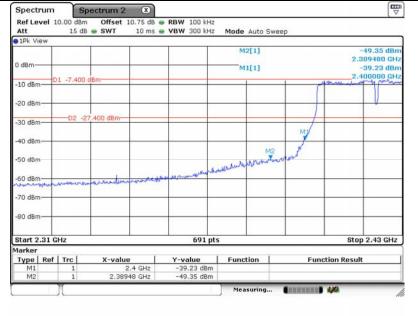
1Pk View			10000		
			M1[1]		33 dBn .0 MH;
0 dBm					
-10 dBm					
-20 dBm	dBro				
-30 dBm	uum				
-40 dBm					
-50 dBm					
M1 -5D dBm - Handreybarrow	m		uchter and have	Massacher	
-70 dBm	Landraansahre	monument		000-1 mgr 0 1 0	and a frace
-80 dBm					
Start 30.0 MHz		691 pts		Stop 25.	0 GHz

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802.11n\_HT40 // Low channel



1Pk View											
					M	1[1]			-57.89 dBm 6.8420 GHz		
0 dBm											
-10 dBm	D1 -8.280 d	Bm									
-20 dBm											
-30 dBm		.280 dBm									
-40 dBm											
-50 dBm		MI									
-60 dBm	and produce and		norman	www.	nymental	www	Manubal	herstad	manun		
-70 dBm											
Start 30.0				601	pts			Ctor	25.0 GHz		

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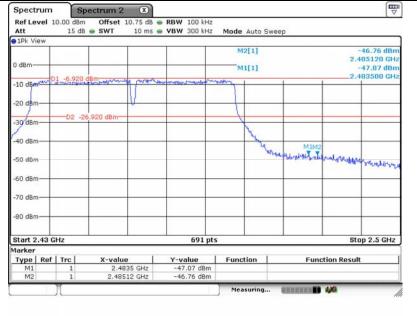
## 802.11n\_HT40// Middle channel

Spectrum	10.00 dBm	ctrum 2	× 10.75 dB •	DD111 100	d fm				
Att	15 dB	SWT		VBW 300		Auto Swee	n		
1Pk View							-		
0 dBm					M	1[1]			58.78 dBm 626.0 MHz
	D1 -7.260 de	3m							
-10 dBm—	01 91200 4								
-20 dBm—			-					-	
-30 dBm	D2 -27.	260 dBm							
-40 dBm									
-50 dBm									
-6D dBm	meron	man			man	antortran	سر در د رسر هما	no punch	A
-70 dBm		ley	al freme have	and the second	andressala				anterior
-80 dBm									
Start 30.0	MHz			69	pts			Stop	25.0 GHz
T	JI					suring			-



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## 802.11n\_HT40 // High channel



1Pk View	22								
				M1[:	1		-57.83 dBm 6.8060 GHz		
0 dBm					1	+	1.8000 GHZ		
-10 dBm	-7.620 dBm								
-20 dBm									
-30 dBm	-D2 -27.620 dB	m				_			
-40 dBm									
-50 dBm		M1				_			
-60 dBm	water water to m	T	Mahum	mound	utrum	habitecomon	Magain		
-70 dBm									
-80 dBm									
Start 30.0 MH	z		691	pts		Stop	25.0 GHz		

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## **3.6.** AC conducted emissions

## 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 50uH/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 frequencies ranges.

Encurrence of Emission (Mg)	Conducted limit (dBµN/m)			
Frequency of Emission (Mz)	<b>Quasi-peak</b>	Average		
0.15 - 0.50	66 - 56*	56 - 46*		
0.50 - 5.00	56	46		
5.00 - 30.0	60	50		

## Note:

- 1. All AC line conducted spurious emission are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and the appropriate frequencies. All data rates and modes were investigated for conducted spurious emission. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.
- 3. Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

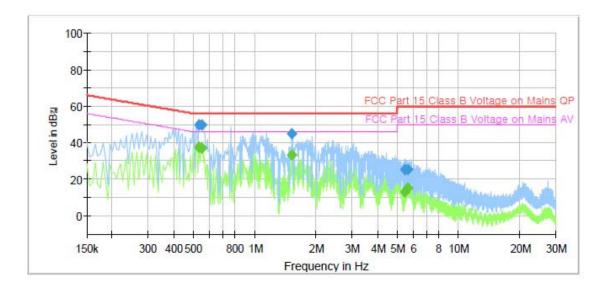


## Test results

# **Test Report**

## Common Information

Test Description: Model No.: Mode Operator Name: Conducted Emission TEST 2.4 GHz KES



## Final Result

Frequency (MHz)	QuasiPeak (dB#V)	CAverage (dB <sub>I</sub> N)	Limit (dBpV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.530000		37.38	46.00	8.62	1000.0	9.000	L1	9.8
0.530000	49.94		56.00	6.06	1000.0	9.000	L1	9.8
0.550000		37.20	46.00	8.80	1000.0	9.000	L1	9.8
0.550000	49.81		56.00	6.19	1000.0	9.000	L1	9.8
1.525000		33.48	46.00	12.52	1000.0	9.000	L1	10.0
1.525000	45.16		56.00	10.84	1000.0	9.000	L1	10.0
5.470000		13.11	50.00	36.89	1000.0	9.000	L1	10.0
5.470000	25.17		60.00	34.83	1000.0	9.000	L1	10.0
5.655000		15.17	50.00	34.83	1000.0	9.000	L1	10.0
5.655000	25.29		60.00	34.71	1000.0	9.000	L1	10.0

### Note; Hot Line

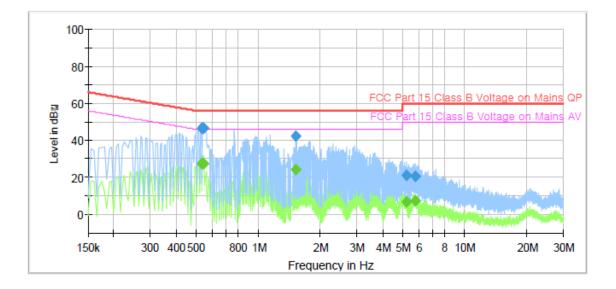


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# **Test Report**

## **Common Information**

Test Description: Model No.: Mode Operator Name: Conducted Emission TEST 2.4 GHz KES



## Final\_Result

Frequency (MHz)	QuasiPeak (dB#V)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	Corr. (dB)
					(ms)			
0.530000		27.51	46.00	18.49	1000.0	9.000	N	9.8
0.530000	46.42		56.00	9.58	1000.0	9.000	N	9.8
0.545000		27.64	46.00	18.36	1000.0	9.000	N	9.8
0.545000	46.74		56.00	9.26	1000.0	9.000	N	9.8
1.525000		24.19	46.00	21.81	1000.0	9.000	N	10.0
1.525000	42.38		56.00	13.62	1000.0	9.000	N	10.0
5.230000		6.74	50.00	43.26	1000.0	9.000	N	10.0
5.230000	21.14		60.00	38.86	1000.0	9.000	Ν	10.0
5.775000		7.59	50.00	42.41	1000.0	9.000	Ν	10.0
5.775000	20.70		60.00	39.30	1000.0	9.000	Ν	10.0

## Note; Neutral Line



Test report No.: KES-RF-16T0067 Page (60 ) of (62)

Equipment	Manufacturer	ıfacturer Model Serial No.		Calibration interval	Calibration due.
Spectrum Analyzer	R&S	FSV40	101002	1 year	2017.07.06
8360B Series Swept Signal Generator	HP	83630B	3844A00786	1 year	2017.01.25
PSG Analog Signal Generator	AGILENT	E8257C	US42340237	1 year	2017.07.05
Attenuator	HP	8494B	2630A12857	1 year	2017.01.21
Power Meter	Anritsu	ML2495A	1438001	1 year	2017.01.25
Pulse Power Sensor	Anritsu	MA2411B	1339205	1 year	2017.01.25
Loop Antenna	R&S	HFH2- Z2.335.4711.52	826532	2 years	2017.03.03
Trilog-broadband antenna	SCHWARZBECK	VULB 9163	9168-713	2 years	2017.05.15
Horn Antenna	A.H.	SAS-571	781	2 years	2017.05.07
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170550	2 years	2017.04.30
High Pass Filter	WAINWRIGHT INSTRUMENT	WHJS3000-10TT	1	1 year	2017.07.04
Low Pass Filter	WEINSCHEL	WLK1.0/18G-10TT	1	1 year	2017.07.04
Preamplifier	SCHWARZBECK	BBV-9718	9718-246	1 year	2016.10.23
Broadband Amplifier	SCHWARZBECK	BBV-9721	PS9721-003	1 year	2017.01.25
EMI Test Receiver	R&S	ESR3	101781	1 year	2017.05.03
EMI Test Receiver	R&S	ESU26	100552	1 year	2017.04.24
EMI Test Receiver	R&S	ESR3	101783	1 year	2017.05.03
LISN	R&S	ENV216	101137	1 year	2017.02.04

## Appendix A. Measurement equipment

## **Peripheral devices**

Device	Manufacturer	Model No.	Serial No.	
Notebook Computer	Samsung Electronics Co., Ltd.	NT-R530	ZWC493BZC00014H	
Test Board	N/A	N/A	N/A	
USB to Serial Converter	Kangwon Electronics	KW-825	N/A	
AC Adapter	Channel Well Technology	2ABE010B	N/A	