

RF TEST REPORT

Test item : Mobile Phone
Model No. : KYY21
Order No. : DEMC1303-01111
Date of receipt : 2013-03-26
Test duration : 2013-04-22 ~ 2013-05-13
Date of issue : 2013-05-14
Use of report : Original Grant

Applicant : KYOCERA Corporation
Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku Yokohama-shi, Kanagawa, Japan

Test laboratory : Digital EMC Co., Ltd.
683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, 449-080, Korea

Test specification : FCC Part 15.407 Subpart E
ANSI C63.10-2009, KDB 789033 v01r03
Test environment : See appended test report
Test result : ☒ Pass ☐ Fail

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of Digital EMC Co., Ltd.

Tested by:

A handwritten signature in blue ink, appearing to be "H.S." with a stylized flourish.

Engineer
HyunSu Son

Witnessed by:

N/A

Reviewed by:

A handwritten signature in blue ink, appearing to be "W. Lee" with a long, sweeping flourish.

Deputy General Manager
WonJung Lee

Test Report Version

Test Report No.	Date	Description
DRTFCC1305-0489	May. 14, 2013	Initial issue

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1. EUT information

1.1 EUT description

FCC Equipment Class	Unlicensed National Information Infrastructure(UNII)
Product	Mobile Phone
Model Name	KYY21
Add Model Name	-
Equipment serial no.	Identical prototype
Frequency Range	802.11a/n(20MHz) : Band I: 5180 ~ 5240MHz Band II: 5260 ~ 5320MHz Band III: 5500 ~ 5700MHz
	802.11n(40MHz) : Band I: 5190 ~ 5230MHz Band II: 5270 ~ 5310MHz Band III: 5510 ~ 5670MHz
Channels	802.11a/n(20MHz): 4 (Band I) / 4 (Band II) / 8 (Band III) 802.11n(40MHz): 2 (Band I) / 2 (Band II) / 3 (Band III)
Modulation type	802.11a/n : OFDM
Data rate	802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n(20MHz): 6.5, 7.2, 13, 14.4, 19.5, 21.7, 26, 28.9, 39, 43.3, 52, 57.8, 58.5, 65, 72.2 Mbps 802.11n(40MHz): 13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150 Mbps
Antenna Specification	Internal Antenna (1TX / 1RX) Max. peak gain: 0 dBi
Power Supply	DC 3.8 V

1.2 Ancillary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2. Information about test items

2.1 Test mode / Channel Information

5GHz Band	Mode	Data Rate
Band I	802.11a	6Mbps
	802.11n(20MHz)	MCS0
	802.11n(40MHz)	MCS0
Band II	802.11a	6Mbps
	802.11n(20MHz)	MCS0
	802.11n(40MHz)	MCS0
Band III	802.11a	6Mbps
	802.11n(20MHz)	MCS0
	802.11n(40MHz)	MCS0

For all test items, the low, middle and high channels of the modes were tested with above worst case data rate.

2.2 Tested Channel Information

5GHz Band	802.11a/n(20MHz)		802.11n(40MHz)	
	Channel	Frequency [MHz]	Channel	Frequency [MHz]
Band I	36	5180	38	5190
	40	5200	-	-
	48	5240	46	5230
Band II	52	5260	54	5270
	56	5280	-	-
	64	5320	62	5310
Band III	100	5500	102	5510
	116	5580	110	5550
	140	5700	134	5670

2.3 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2.4 Tested environment

Temperature	: 23 ~ 24 °C
Relative humidity content	: 52 ~ 55 % R.H.
Details of power supply	: DC 3.8 V

2.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing
→ None

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	RSS Section(s)	Parameter	Limit	Test Condition	Status Note 1
I. Transmitter Mode (TX)					
15.407(a)	N/A	Emission Bandwidth (26 dB Bandwidth)	N/A	Conducted	C
15.407(a)	RSS-210 [A9.2]	Maximum Conducted Output Power	5150 ~ 5250MHz For FCC 50mW or $<4 + 10\log_{10}(B)$ dBm, whichever power is less. 5150 ~ 5250MHz For IC 200mW or $<10 + 10\log_{10}(B)$ dBm, whichever power is less. 5250 ~ 5350MHz For FCC & IC 250mW or $<11 + 10\log_{10}(B)$ dBm, whichever power is less. 5470 ~ 5725MHz For FCC & IC 250mW or $<11 + 10\log_{10}(B)$ dBm, whichever power is less.		C
15.407(a)	RSS-210 [A9.2]	Peak Power Spectral Density	5150 ~ 5250MHz For FCC: 4dBm/MHz 5150 ~ 5250MHz For IC: 10dBm/MHz 5250 ~ 5350MHz For FCC & IC: 11dBm/MHz 5470 ~ 5725MHz For FCC & IC: 11dBm/MHz		C
15.407(a)	N/A	Peak Excursion	< 13 dB/MHz maximum difference		C
15.407(g)	N/A	Frequency Stability	N/A		C
-	RSS Gen [4.6.1]	Occupied Bandwidth (99%)	N/A		C
15.407(b)	RSS-210 [A9.2]	Undesirable Emissions	< -27 dBm/MHz EIRP	Radiated	C
15.205 15.209 15.407(b)	RSS-Gen [7.2.5]	General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		C Note.2
15.407(h)	RSS-210 [A9.3]	Dynamic Frequency Selection	See DFS test report	-	C Note.3
15.207	RSS-Gen [7.2.4]	AC Conducted Emissions	FCC 15.207	AC Line Conducted	C
15.203	RSS-Gen [7.1.2]	Antenna Requirements	FCC 15.203	-	C
Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable Note 2: These test items were performed in each axis and the worst case data was reported. Note 3: For DFS testing, please refer to DFS test report.					

3.2 Transmitter requirements

3.2.1 26 dB Bandwidth

Test Requirements

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. The 26dB bandwidth is used to determine the conducted output power limit.

■ TEST CONFIGURATION

Refer to the APPENDIX I.

■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033**.

1. Set resolution bandwidth (RBW) = approximately 1 % of the EBW.
2. Set the video bandwidth (VBW) > RBW.
3. Detector = **Peak**.
4. Trace mode = **max hold**.

Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

■ TEST RESULTS: **Comply**

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	Band I	36	5180	21.790
		40	5200	21.360
		48	5240	21.910
	Band II	52	5260	21.560
		56	5280	21.610
		64	5320	21.730
	Band III	100	5500	21.610
		116	5580	21.890
		140	5700	21.720
802.11n (20MHz)	Band I	36	5180	21.940
		40	5200	21.990
		48	5240	21.960
	Band II	52	5260	21.980
		56	5280	21.690
		64	5320	22.000
	Band III	100	5500	21.830
		116	5580	21.880
		140	5700	21.760
802.11n (40MHz)	Band I	38	5190	42.390
		46	5230	42.450
	Band II	54	5270	42.580
		62	5310	42.910
	Band III	102	5510	42.620
		110	5550	42.800
		134	5670	42.890

■ RESULT PLOTS

26 dB Bandwidth

Test Mode: 802.11a & Ch.36



26 dB Bandwidth

Test Mode: 802.11a & Ch.40



26 dB Bandwidth

Test Mode: 802.11a & Ch.48



26 dB Bandwidth

Test Mode: 802.11a & Ch.52



26 dB Bandwidth

Test Mode: 802.11a & Ch.56



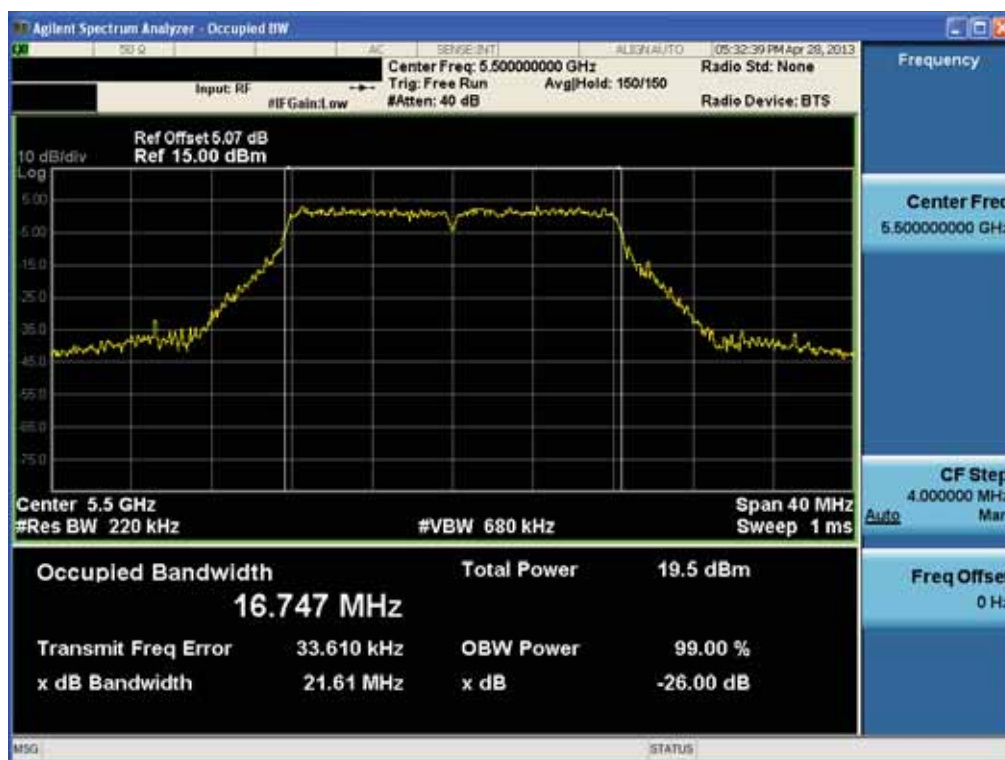
26 dB Bandwidth

Test Mode: 802.11a & Ch.64



26 dB Bandwidth

Test Mode: 802.11a & Ch.100



26 dB Bandwidth

Test Mode: 802.11a & Ch.116



26 dB Bandwidth

Test Mode: 802.11a & Ch.140



26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.36



26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.40



26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.48



26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.52



26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.56



26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.64



26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.100



26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.116



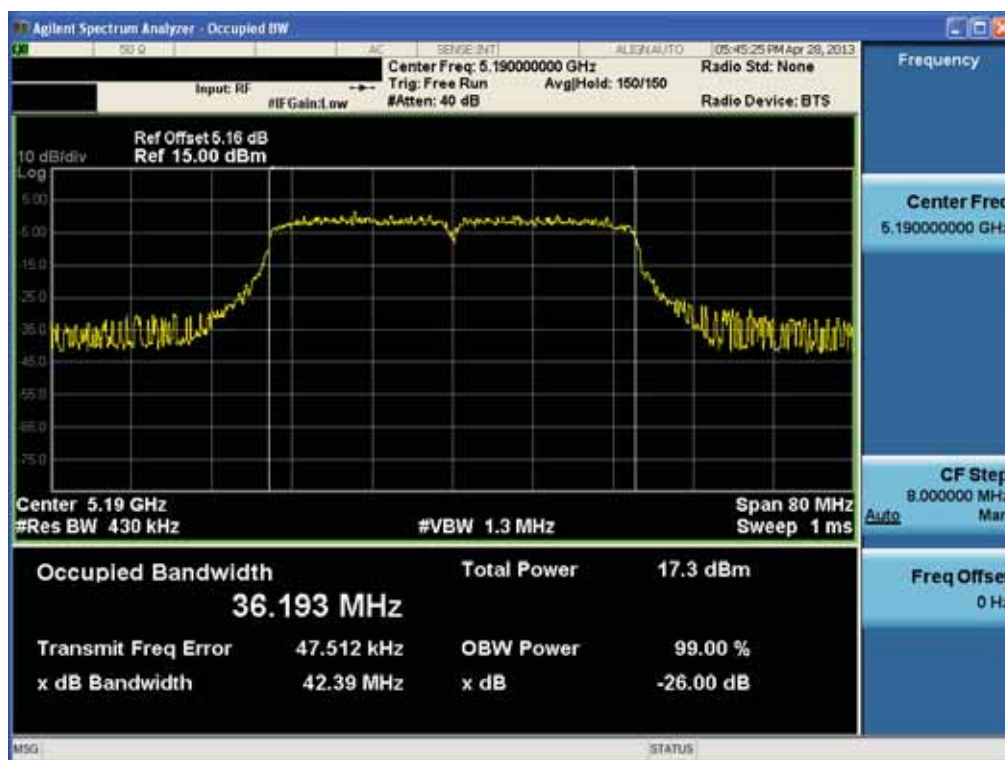
26 dB Bandwidth

Test Mode: 802.11n-HT20 & Ch.140



26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.38



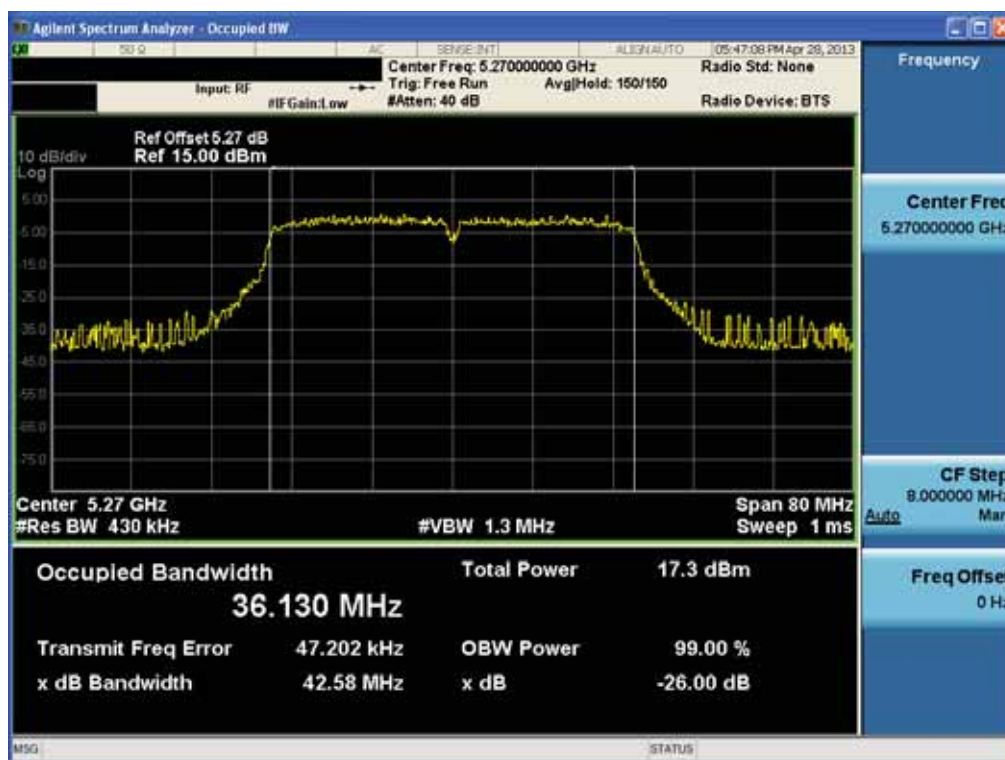
26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.46



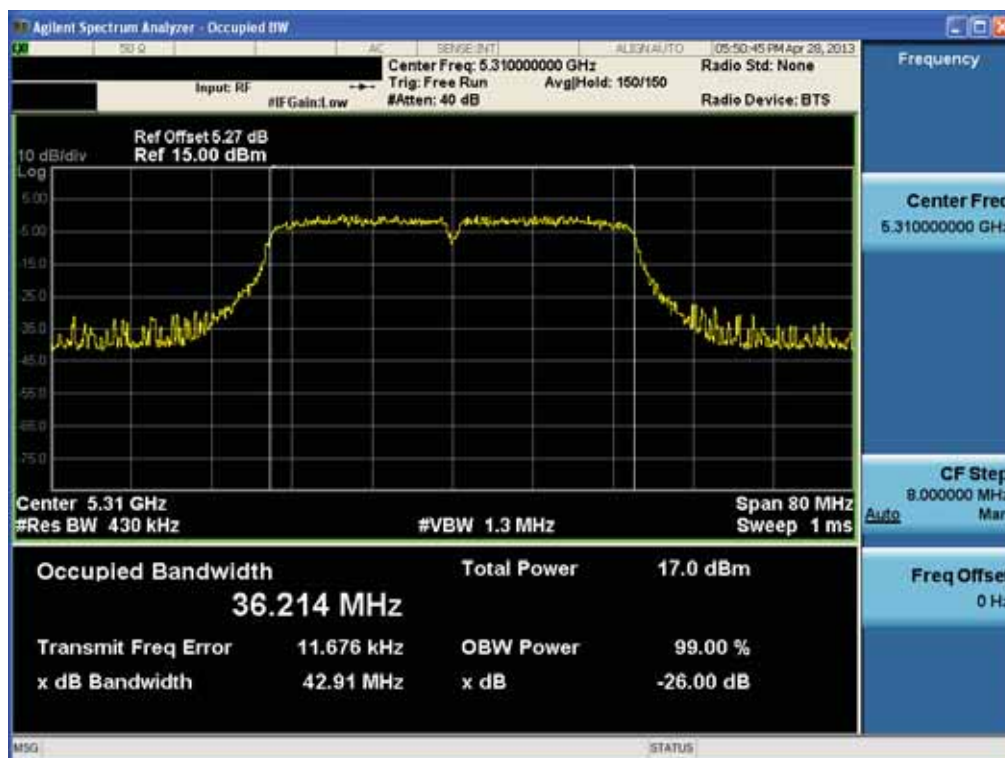
26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.54



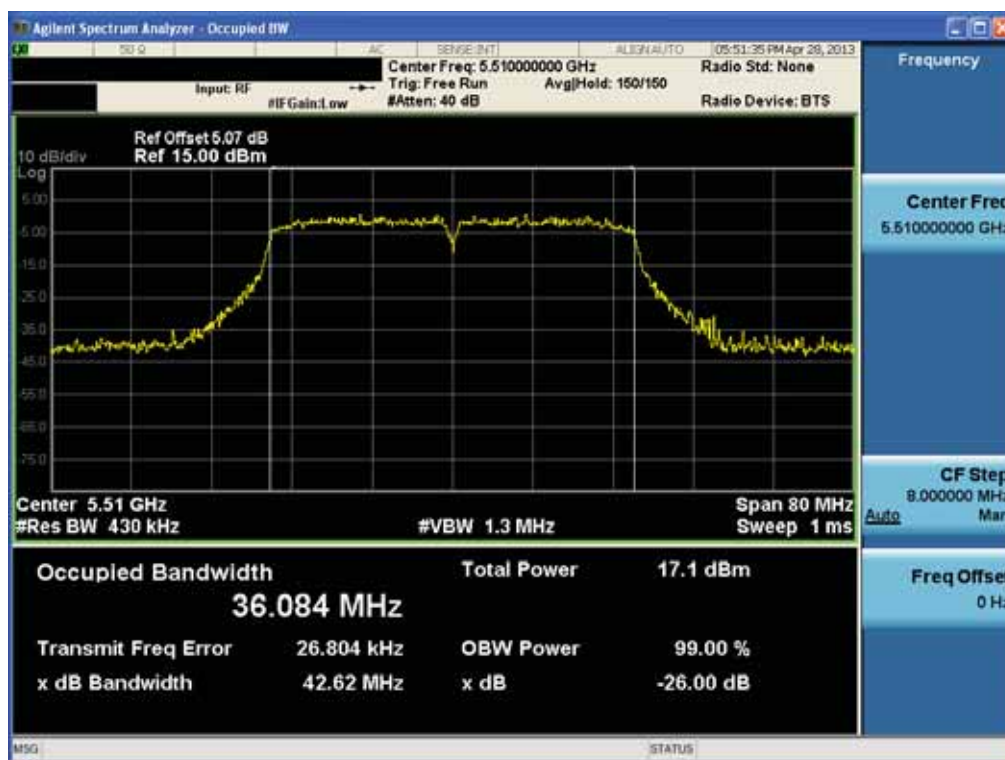
26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.62



26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.102



26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.110



26 dB Bandwidth

Test Mode: 802.11n-HT40 & Ch.134



3.2.2 Output Power

Test Requirements

- (1) For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10\log B$, where B is the 26 dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10\log B$, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- Output power Limit Calculation

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	ANT Gain	Determined Limit [dBm]
		Least 26dBC BW [MHz]			
Band I	802.11a	50	16.98	0	16.98
		21.360	17.29		
	802.11n HT20	50	16.98		16.98
		21.940	17.41		
	802.11n HT40	50	16.98		16.98
		42.390	20.27		

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	ANT Gain	Determined Limit [dBm]
		Least 26dBC BW [MHz]			
Band II	802.11a	250	23.97	0	23.97
		21.560	24.33		
	802.11n HT20	250	23.97		23.97
		21.690	24.36		
	802.11n HT40	250	23.97		23.97
		42.580	27.29		
Band III	802.11a	250	23.97	0	23.97
		21.610	24.34		
	802.11n HT20	250	23.97		23.97
		21.760	24.37		
	802.11n HT40	250	23.97		23.97
		42.620	27.29		

■ TEST CONFIGURATION

Refer to the APPENDIX I.

■ TEST PROCEDURE:

Maximum Conducted Output Power is measured using Measurement Procedure **Method SA-2 of KDB789033**

1. Set the **RBW = 1 MHz & VBW ≥ 3 MHz**.
2. Set span to encompass the **26 dB EBW** (or, alternatively, the entire 99% occupied bandwidth) of the signal.
3. Detector = **RMS (power averaging)**
4. Sweep time = **auto couple**.
5. **Trace average at least 100 traces in power averaging.**
6. **Compute power by integrating the spectrum across the 26 dB EBW** (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges.
7. **Add $10 \log(1/x)$, where x is the duty cycle**, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission)

■ TEST RESULTS : **Comply**

Mode	Channel	Frequency [MHz]	Reading [dBm]	Duty Cycle			DCF [dB]	Test Result [dBm]
				On Time[ms]	On+Off Time[ms]	X		
802.11a	36	5180	12.220	1.355	1.375	0.98	0.09	12.310
	40	5200	12.210					12.300
	48	5240	12.420					12.510
	52	5260	13.630	1.355	1.375	0.98	0.09	13.720
	56	5280	13.640					13.730
	64	5320	13.300					13.390
	100	5500	13.230	1.355	1.375	0.98	0.09	13.320
	116	5580	13.460					13.550
	140	5700	13.060					13.150

Mode	Channel	Frequency [MHz]	Reading [dBm]	Duty Cycle			DCF [dB]	Result
				On Time[ms]	On+Off Time[ms]	X		
802.11n (20MHz)	36	5180	12.160	1.268	1.287	0.98	0.09	12.250
	40	5200	12.130					12.220
	48	5240	12.300					12.390
	52	5260	13.620	1.268	1.287	0.98	0.09	13.710
	56	5280	13.220					13.310
	64	5320	13.280					13.370
	100	5500	13.210	1.268	1.287	0.98	0.09	13.300
	116	5580	13.430					13.520
	140	5700	13.040					13.130
802.11n (40MHz)	38	5190	11.310	0.636	0.642	0.99	0.05	11.360
	46	5230	11.050					11.100
	54	5270	11.360	0.636	0.642	0.99	0.05	11.410
	62	5310	11.000					11.050
	102	5510	11.310	0.636	0.642	0.99	0.05	11.360
	110	5550	11.330					11.380
	134	5670	11.210					11.260

Note 1 : $DCF = 10 \log(1/X)$, $X = \text{On Time} / (\text{On} + \text{Off time})$

Note 2 : Test Result = Measurement Data + DCF

■ Measurement Data PLOTS

Output Power

Test Mode: 802.11a & Ch.36



Output Power

Test Mode: 802.11a & Ch.40



Output Power

Test Mode: 802.11a & Ch.48



Output Power

Test Mode: 802.11a & Ch.52



Output Power

Test Mode: 802.11a & Ch.56



Output Power

Test Mode: 802.11a & Ch.64



Output Power

Test Mode: 802.11a & Ch.100



Output Power

Test Mode: 802.11a & Ch.116



Output Power

Test Mode: 802.11a & Ch.140



Output Power

Test Mode: 802.11n HT20 & Ch.36



Output Power

Test Mode: 802.11n HT20 & Ch.40



Output Power

Test Mode: 802.11n HT20 & Ch.48



Output Power

Test Mode: 802.11n HT20 & Ch.52



Output Power

Test Mode: 802.11n HT20 & Ch.56



Output Power

Test Mode: 802.11n HT20 & Ch.64



Output Power

Test Mode: 802.11n HT20 & Ch.100



Output Power

Test Mode: 802.11n HT20 & Ch.116



Output Power

Test Mode: 802.11n HT20 & Ch.140



Output Power

Test Mode: 802.11n HT40 & Ch.38



Output Power

Test Mode: 802.11n HT40 & Ch.46



Output Power

Test Mode: 802.11n HT40 & Ch.54



Output Power

Test Mode: 802.11n HT40 & Ch.62



Output Power

Test Mode: 802.11n HT40 & Ch.102



Output Power

Test Mode: 802.11n HT40 & Ch.110



Output Power

Test Mode: 802.11n HT40 & Ch.134



3.2.3 Peak Power Spectral Density

Test requirements

- (1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1MHz band.
- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- Peak Power Spectral Density Limit Calculation

Band	Limit [dBm]	ANT Gain [dBi]	Determined Limit [dBm]
Band I	4	0	4
Band II	11	0	11
Band III	11	0	11

■ TEST CONFIGURATION

Refer to the APPENDIX I.

■ TEST PROCEDURE

Peak Power Spectral Density is measured using Measurement Procedure of **KDB789033**

- 1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power...". (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
- 2) Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
- 3) Make the following adjustments to the peak value of the spectrum, if applicable:
 - a) If Method SA-2 or SA-2 Alternative was used, add $10 \log(1/x)$, where x is the duty cycle, to the peak of the spectrum.
 - b) If Method SA-3 Alternative was used and the linear mode was used in step E)2)g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
- 4) The result is the PPSD.

■ TEST RESULT : **Comply**

Mode	Channel	Frequency [MHz]	Reading [dBm]	Duty Cycle			DCF [dB]	Test Result [dBm]
				On Time[ms]	On+Off Time[ms]	X		
802.11a	36	5180	1.563	1.335	1.375	0.98	0.09	1.653
	40	5200	1.477					1.567
	48	5240	1.360					1.450
	52	5260	2.849	1.335	1.375	0.98	0.09	2.939
	56	5280	2.692					2.782
	64	5320	2.415					2.505
	100	5500	2.387	1.335	1.375	0.98	0.09	2.477
	116	5580	2.774					2.864
	140	5700	2.502					2.592

Mode	Channel	Frequency [MHz]	Reading [dBm]	Duty Cycle			DCF [dB]	Test Result [dBm]
				On Time[ms]	On+Off Time[ms]	X		
802.11n (20MHz)	36	5180	1.377	1.268	1.287	0.98	0.09	1.467
	40	5200	1.649					1.739
	48	5240	1.390					1.480
	52	5260	2.996	1.268	1.287	0.98	0.99	3.086
	56	5280	2.888					2.978
	64	5320	2.618					2.708
	100	5500	2.932	1.268	1.287	0.98	0.99	3.022
	116	5580	2.883					2.973
	140	5700	2.534					2.624
802.11n (40MHz)	38	5190	-2.400	0.636	0.642	0.99	0.05	-2.350
	46	5230	-2.010					-1.960
	54	5270	-2.061	0.636	0.642	0.99	0.05	-2.011
	62	5310	-2.339					-2.289
	102	5510	-2.322	0.636	0.642	0.99	0.05	-2.272
	110	5550	-2.174					-2.124
	134	5670	-2.497					-2.447

Note 1 : DCF = $10\log(1/X)$, $X = \text{On Time} / (\text{On} + \text{Off time})$

Note 2 : Test Result = Measurement Data + DCF

■ Measurement Data PLOTS

Peak Power Spectral Density

Test Mode: 802.11a & Ch.36



Peak Power Spectral Density

Test Mode: 802.11a & Ch.40



Peak Power Spectral Density

Test Mode: 802.11a & Ch.48



Peak Power Spectral Density

Test Mode: 802.11a & Ch.52



Peak Power Spectral Density

Test Mode: 802.11a & Ch.56



Peak Power Spectral Density

Test Mode: 802.11a & Ch.64



Peak Power Spectral Density

Test Mode: 802.11a & Ch.100



Peak Power Spectral Density

Test Mode: 802.11a & Ch.116



Peak Power Spectral Density

Test Mode: 802.11a & Ch.140



Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.36



Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.40



Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.48



Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.52



Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.56



Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.64



Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.100



Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.116



Peak Power Spectral Density

Test Mode: 802.11n HT20 & Ch.140



Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.38



Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.46



Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.54



Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.62



Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.102



Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.110



Peak Power Spectral Density

Test Mode: 802.11n HT40 & Ch.134

