





3.5. Bandwidth

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(2)

Test Item	Limit	Frequency Range(MHz)
Bandwidth	>=500 KHz (6dB bandwidth)	2400~2483.5

Test Configuration

EUT	Spectrum Analyzer

Test Procedure

- 5. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- DTS Spectrum Setting: 6.
 - (1) Set RBW = 100 kHz.
 - (2) Set the video bandwidth (VBW) \geq 3 RBW.
 - (3) Detector = Peak.
 - (4) Trace mode = Max hold.
 - (5) Sweep = Auto couple.
 - OCB Spectrum Setting:
 - (1) Set RBW = $1\% \sim 5\%$ occupied bandwidth.
 - (2) Set the video bandwidth (VBW) \geq 3 RBW.
 - (3) Detector = Peak.
 - (4) Trace mode = Max hold.
 - (5) Sweep = Auto couple.

NOTE: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

Test Mode

Please refer to the clause 2.3.

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Test Results



DTS Bandwidth Test Result

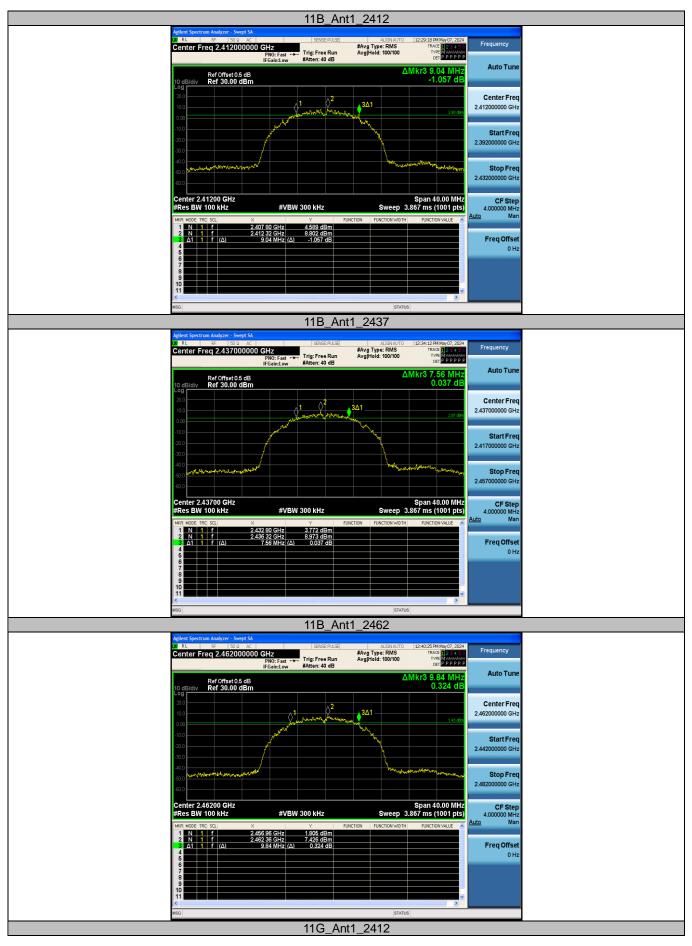
TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
		2412	9.040	2407.800	2416.840	0.5	PASS
11B	Ant1	2437	7.560	2432.800	2440.360	0.5	PASS
		2462	9.840	2456.960	2466.800	0.5	PASS
		2412	16.400	2403.600	2420.000	0.5	PASS
11G	Ant1	2437	16.560	2428.520	2445.080	0.5	PASS
		2462	16.360	2453.640	2470.000	0.5	PASS
		2412	17.600	2403.000	2420.600	0.5	PASS
11N20SISO	Ant1	2437	17.080	2428.280	2445.360	0.5	PASS
		2462	17.440	2453.160	2470.600	0.5	PASS
		2422	35.120	2404.240	2439.360	0.5	PASS
11N40SISO	Ant1	2437	32.320	2421.160	2453.480	0.5	PASS
		2452	34.960	2434.320	2469.280	0.5	PASS

Occupied Channel Bandwidth Test Result

TestMode	Antenna	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
		2412	13.044	2405.2855	2418.3295		
11B	Ant1	2437	12.980	2430.3046	2443.2846		
		2462	12.987	2455.2981	2468.2851		
		2412	16.805	2403.4435	2420.2485		
11G	Ant1	2437	16.776	2428.4379	2445.2139		
		2462	16.796	2453.4450	2470.2410		
		2412	17.533	2403.0479	2420.5809		
11N20SISO	Ant1	2437	17.533	2428.0630	2445.5960		
		2462	17.514	2453.0672	2470.5812		
		2422	35.800	2403.9338	2439.7338		
11N40SISO	Ant1	2437	35.762	2418.9421	2454.7041		
		2452	35.826	2433.9657	2469.7917		



DTS Bandwidth Test Graphs



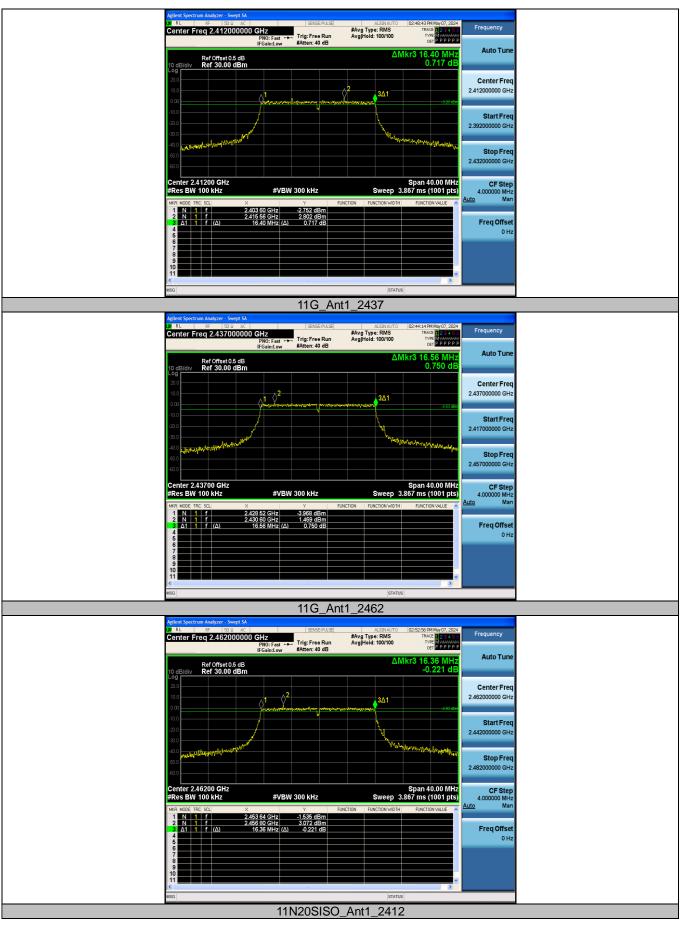
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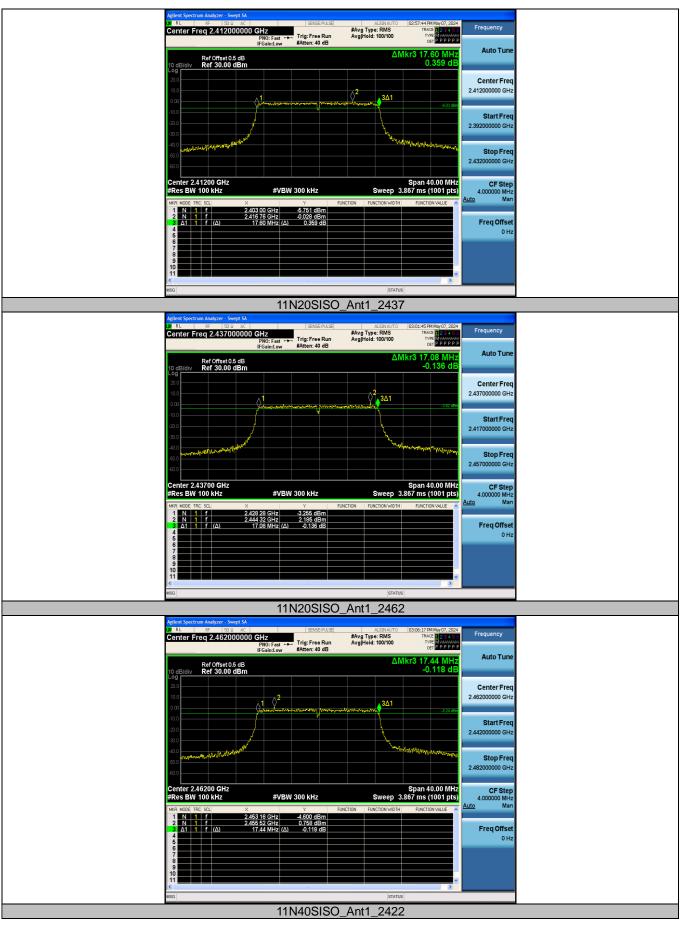
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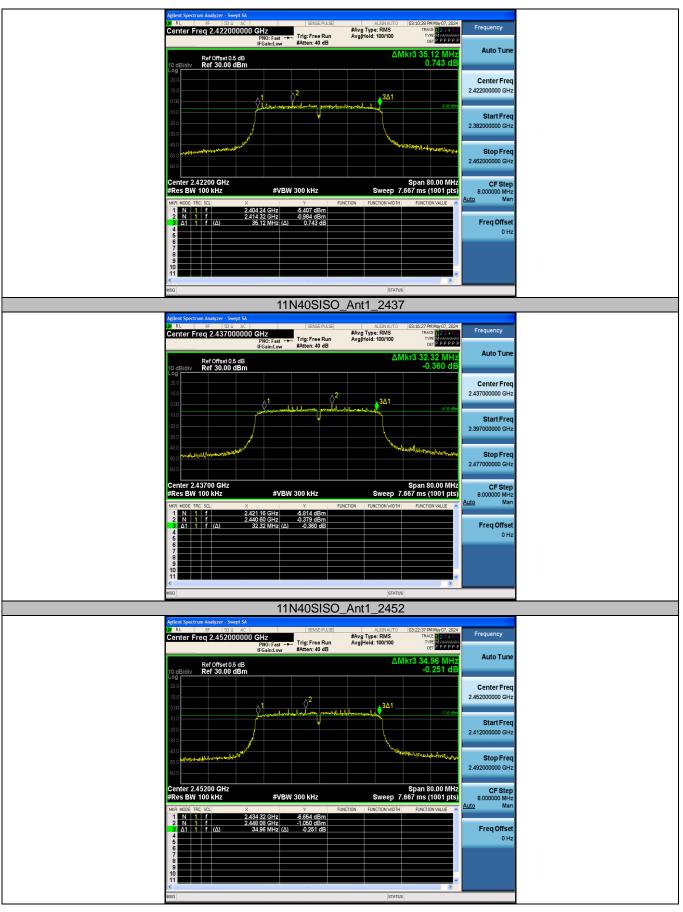
















Occupied Channel Bandwidth Test Result



CTC Laboratories, Inc.

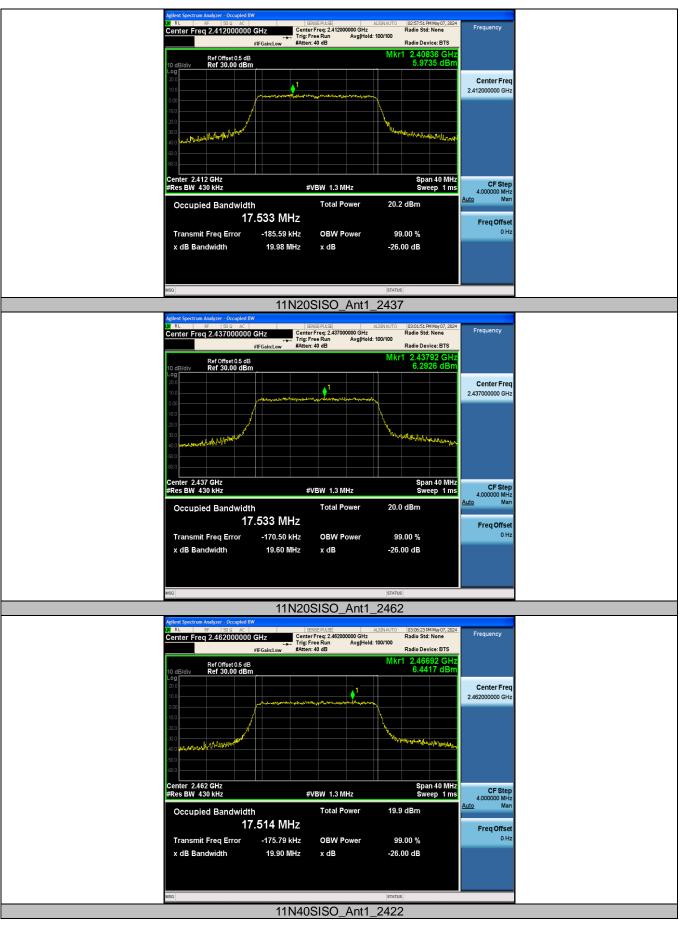






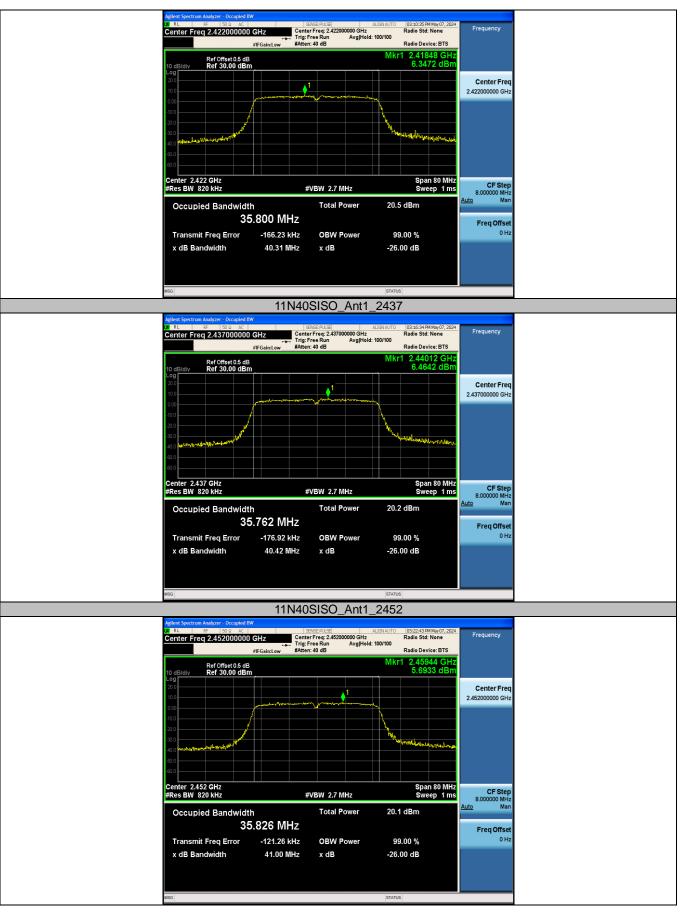


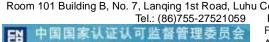














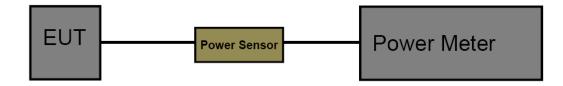
3.6. Output Power

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(3)

Section	Test Item	Limit	Frequency Range(MHz)
CFR 47 FCC 15.247(b)(3)	Maximum conducted output power	1 Watt or 30dBm	2400~2483.5

Test Configuration



Test Procedure

- 1. The maximum conducted output power may be measured using a broadband RF power meter.
- Power measurements were performed only when the EUT was transmitting at its maximum power 2. control level using a broadband power meter with a pulse sensor.
- The power meter implemented triggering and gating capabilities which were set up such that power 3. measurements were recorded only during the ON time of the transmitter.
- 4. Record the measurement data.

Test Mode

Please refer to the clause 2.3

Test Result

Test Mode	Antenna	Frequency [MHz]	AV Result [dBm]	Limit [dBm]	Verdict
		2412	16.45	≤30.00	PASS
11B	Ant1	2437	16.41	≤30.00	PASS
		2462	16.15	≤30.00	PASS
		2412	14.86	≤30.00	PASS
11G	Ant1	2437	15.05	≤30.00	PASS
		2462	14.66	≤30.00	PASS
		2412	14.06	≤30.00	PASS
11N20SISO	Ant1	2437	13.80	≤30.00	PASS
		2462	13.81	≤30.00	PASS
		2422	13.51	≤30.00	PASS
11N40SISO	Ant1	2437	13.20	≤30.00	PASS
		2452	13.12	≤30.00	PASS

Note:

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1. Test results increased RF cable loss by 0.5dB.



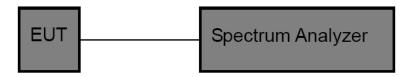
3.7. Power Spectral Density

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (e)

Test Item	Limit	Frequency Range(MHz)	
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5	

Test Configuration

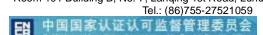


Test Procedure

- 1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in 2. the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05r02.
- Spectrum Setting: 3.
- 3. Spectrum Setting:
- Measure the duty cycle (D) of the transmitter output signal as described in 11.6.
- b) Set instrument center frequency to DTS channel center frequency.
- c) Set span to at least 1.5 times the OBW.
- d) Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- e) Set VBW \geq [3 \times RBW].
- f) Detector = power averaging (rms) or sample detector (when rms not available).
- g) Ensure that the number of measurement points in the sweep \Box [2 \times span / RBW].
- h) Sweep time = auto couple.
- i) Do not use sweep triggering; allow sweep to "free run."
- j) Employ trace averaging (rms) mode over a minimum of 100 traces.
- k) Use the peak marker function to determine the maximum amplitude level.
- I) Add [10 log (1 / D)], where D is the duty cycle measured in step a), to the measured PSD to compute the average PSD during the actual transmission time.
- m) If measured value exceeds requirement specified by regulatory agency, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced).

Test Mode

Please refer to the clause 2.3

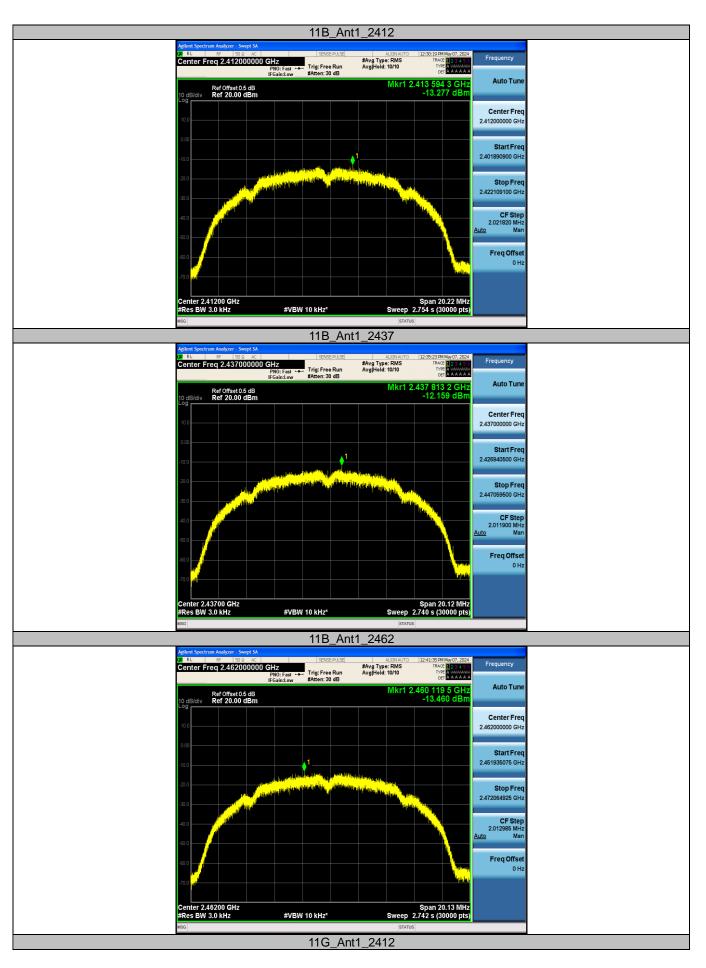




Test Result

TestMode	Antenna	Frequency[MHz]	AV Result [dBm/3kHz]	Limit[dBm/3kHz]	Verdict
		2412	-13.28	≤8.00	PASS
11B	Ant1	2437	-12.16	≤8.00	PASS
		2462	-13.46	≤8.00	PASS
		2412	-15.53	≤8.00	PASS
11G	Ant1	2437	-16.40	≤8.00	PASS
		2462	-15.65	≤8.00	PASS
		2412	-17.59	≤8.00	PASS
11N20SISO	Ant1	2437	-17.33	≤8.00	PASS
		2462	-17.17	≤8.00	PASS
		2422	-19.12	≤8.00	PASS
11N40SISO	Ant1	2437	-19.55	≤8.00	PASS
		2452	-20.16	≤8.00	PASS

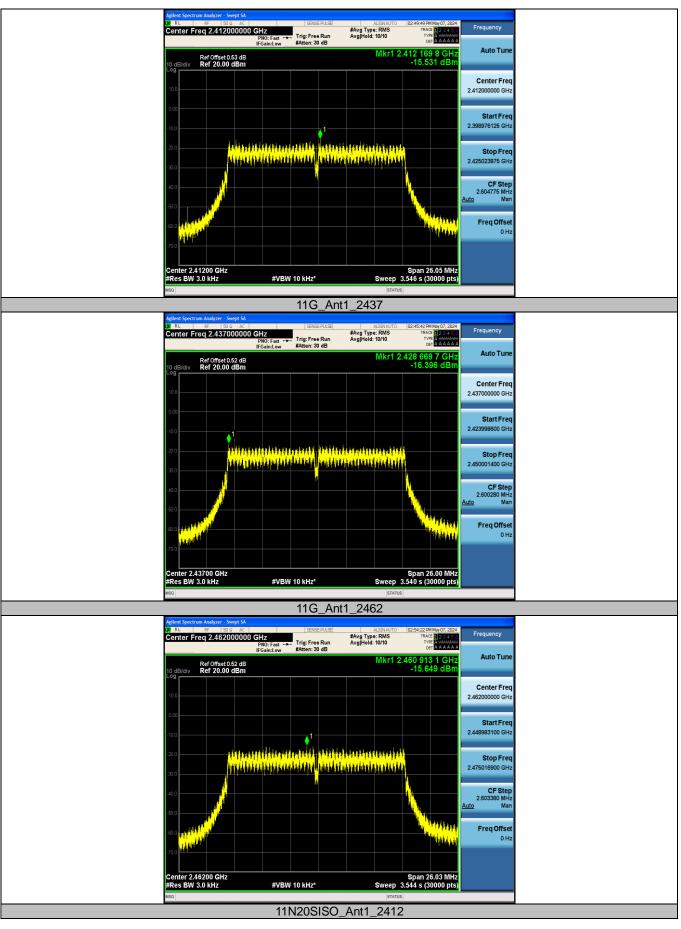




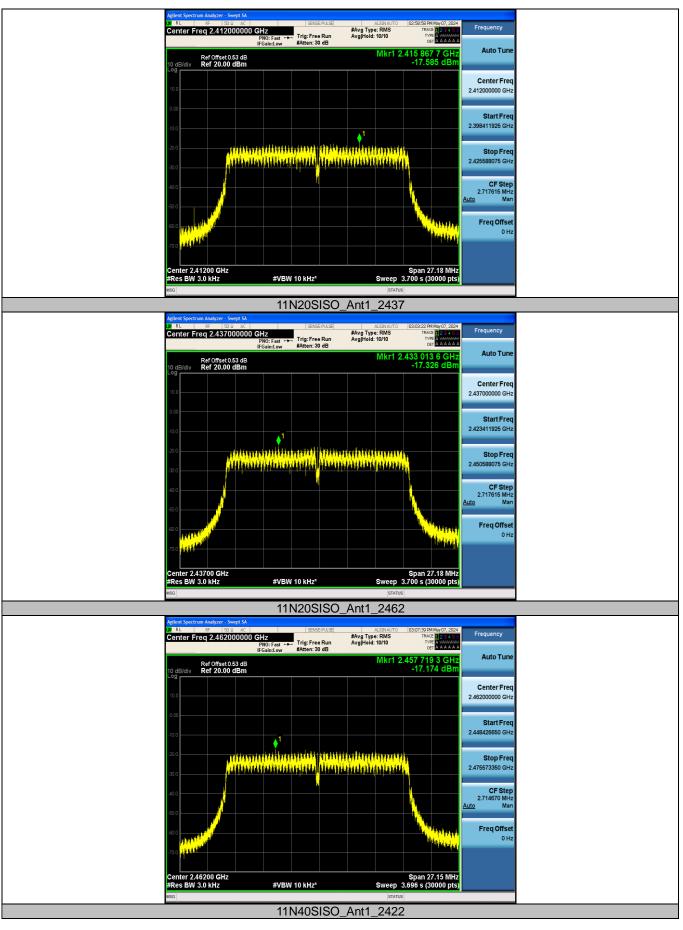
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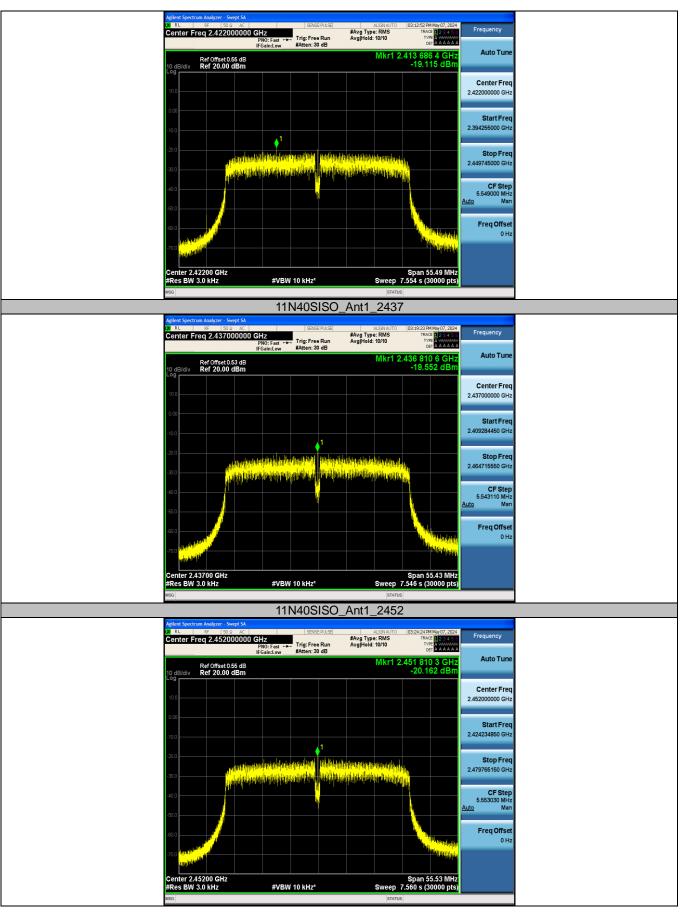


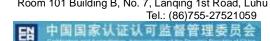












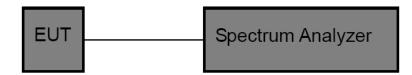


3.8. Duty Cycle

Limit

None, for report purposes only.

Test Configuration



Test Procedure

- 1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- 2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05r02.

3. Spectrum Setting: Set analyzer center frequency to test channel center frequency. Set the span to 0Hz. Set the RBW to 10MHz. Set the VBW to 10MHz. Detector: Peak. Sweep time: Auto. Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

Test Mode

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Please refer to the clause 2.4.



Test Result

TestMode	Antenna	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T Minimum VBW (kHz)	Final Setting for VBW (kHz)
		2412	19.00	19.00	100.00	0.05	1
11B	Ant1	2437	19.00	19.00	100.00	0.05	1
		2462	19.00	19.00	100.00	0.05	1
		2412	5.47	5.51	99.27	0.18	1
11G	Ant1	2437	5.48	5.51	99.46	0.18	1
		2462	5.49	5.51	99.64	0.18	1
		2412	5.07	5.10	99.41	0.20	1
11N20SISO	Ant1	2437	5.08	5.11	99.41	0.20	1
		2462	5.08	5.11	99.41	0.20	1
		2422	2.46	2.49	98.80	0.41	1
11N40SISO	Ant1	2437	2.47	2.49	99.20	0.40	1
		2452	2.47	2.50	98.80	0.40	1



11B_Ant1_2412 Trig Delay-2.000 ms #Avg Type: RMS Trig: Video #Atten: 40 dB KL RF 50.9. AL Center Freq 2.412000000 GHz PN0: Fast → IFGain:Low Frequency PPPPP Auto Tun Ref Offset 0.5 dB Ref 30.00 dBm Center Free 2.412000000 GH Start Free 2.412000000 G Stop Free 2.412000000 GH enter 2.412000000 GHz es BW 8 MHz Span 0 Hz Sweep 19.00 ms (1001 pts) CF Step 8.000000 MH #VBW 8.0 MHz Auto M Freq Offse 0 H: 11B_Ant1_2437 21 RL 8F 50.0 AC |SDREPULSE| ALIGNAU Center Freq 2.4370000000 GHz Trig Delay-2.000 ms #Avg Type: RMS PN0: Fast →→ Trig: Video #FGain.tow #Atten: 40 dB Frequency TYPE WANTANA Auto Tur Ref Offset 0.5 dB Ref 30.00 dBm Center Freq 2.437000000 GH Start Free 2.437000000 G Stop Free 2.4370000 00 GH ter 2.437000000 GHz Span 0 Hz Sweep 19.00 ms (1001 pts) CF Step 8.000000 MH #VBW 8.0 MHz Auto Ma Freq Offse 0 H2 11B_Ant1_2462 SENSE:PULSE ALIGN AU Trig Delay-2.000 ms #Avg Type: RMS → Trig: Video #Atten: 40 dB Center Freq 2.462000000 GHz Frequency 12345 Watatata PPPPP Auto Tun Ref Offset 0.5 dB Ref 30.00 dBm Center Free 2.462000000 GH Start Free 2.4620000 Stop Free 2.462000000 GH Center 2.462000000 GHz Res BW 8 MHz Span 0 Hz Sweep 19.00 ms (1001 pts) CF Step 8.000000 MH #VBW 8.0 MHz Auto Ma Freq Offse 0 H 11G_Ant1_2412















Agilent Spectrum Analyzer - Swept SA	2004
NL RL RF SD2. AC SERIEF ALISE ALIGNAUTO 03:10:20 FM Marg Center Freq 2.422000000 GHz Trig Delay-2.000 ms #Avg Type: RMS TRig PN0: Fast Trig: Video Trig: Video Trig: Video	H S 6 Frequency
IFGain:Low #Atten: 40 dB DET P	Auto Turo
Ref Offset 0.5 dB ∆Mkr3 2.490 10 dB/div Ref 30.00 dBm -1.90	
$\sum_{n=0}^{2-2} d\mu \cos \theta \cdot \delta \left[-\frac{1}{2} \sin \theta \cos \theta \cdot \delta \left[-\frac{1}{2} \sin \theta \sin \theta \cos \theta \sin \theta \cos \theta \sin \theta \sin \theta \sin \theta \sin \theta \sin \theta$	Center Freq 2.42200000 GHz
-10.0	Start Freq
.200	2.422000000 GHz
-40.0	
40.0	Stop Freq
-60.0	2.422000000 GHz
Center 2.422000000 GHz Span	
Res BW 8 MHz #VBW 8.0 MHz Sweep 5.000 ms (1001	pts) 8.000000 MHz
MRR MODE ThC SCL X Y FUNCTION FUNCTION VIDITH	
1 N 1 t 1.480 ms 9.61 dBm 2 Δ1 1 t (Δ) 2.460 ms (Δ) 3.48 dB 3 Δ1 1 t (Δ) 2.490 ms (Δ) 3.48 dB	Freq Offset
4 5	0 Hz
7	
9 10	
	2
 MSG STATUS	
11N40SISO_Ant1_2437	
Agilent Spectrum Analyzer - Swept SA UR RL RF 50 g AC SENSEPULSE ALIGNAUTO 03:16:18 PM May 0	2004
Center Freq 2.437000000 GHz Trig Delay-2.000 ms #Avg Type: RMS TRACE 12	456 Frequency
IFGain:Low #Atten: 40 dB DET PP	
Ref offset 0.5 dB ∆Mkr3 2.490 10 dB/div Ref 30.00 dBm -0.37	
10 dB/div Ref 30.00 dBm -0.37	
$^{20.0}_{10.0}$ in here is a next present of the set	1 No. 2.43700000 GHz
0.00	2.40700000 012
-10.0	Start Freq
-20.0	
300	
50.0	Stop Freq
-60.0	2.437000000 GHz
Center 2.437000000 GHz Span	0 Hz CF Step
Res BW 8 MHz #VBW 8.0 MHz Sweep 5.000 ms (1001	Auto Man
Mr.R MODE TRC ISCL X Y FUNCTION FUNCTION WOTH FUNCTION VALU 1 N 1 t 2.090 ms 7.60 dBm 7.60 d	
1 N 1 t 2.030 ms 7.60 dBm 2 Δ1 1 t (Δ) 2.470 ms (Δ) 4.46 dB 3 Δ1 1 t (Δ) 2.490 ms (Δ) 0.37 dB	FreqOffset
	0 Hz
7	
9	
	2
MSG STATUS	
11N40SISO_Ant1_2452	
Agilent Spectrum Analyzer - Swept SA	
D RL RF SD Q AC SENSEPUSE ALISHAUTO D3/32228 FM May CI Center Freq 2.4552000000 GHz Trig Delay-2.000 ms #Avg Type: RMS TRACE Trig Video	3 4 5 6 Frequency
PNO: Fast ++ Ing. video IFGain:Low #Atten: 40 dB DET	
Ref Offset 0.5 dB ∆Mkr3 2.500 10 dB/div Ref 30.00 dBm 1.19	MS Auto Tune
Log	
$\frac{20.0}{10.0} \frac{3\Delta 1}{\pi}$	Center Freq 2.45200000 GHz
	2.40200000 0112
-10.0	Start Freq
-20.0	2.45200000 GHz
-40.0	Stop Freq
-60 0	2.452000000 GHz
Center 2.452000000 GHz Span	0 Hz CF Step
Res BW 8 MHz #VBW 8.0 MHz Sweep 5.000 ms (1001	pts) 8.000000 MHz
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE 1 N 1 t 1.050 ms 7.59 dBm FUNCTION FUNCTION VALUE	Auto Man
1 N 1 t 1.030 ms 7.59 dBm 2 Δ1 1 t (Δ) 2.470 ms (Δ) 3.033 dB 3 Δ1 1 t (Δ) 2.470 ms (Δ) 3.033 dB	Freq Offset
4	0 Hz
8	
	×
MSG STATUS	



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3.9. Antenna requirement

<u>Requirement</u>

FCC CFR Title 47 Part 15 Subpart C 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. The use of a permanently attached antenna or of antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

<u>Test Result</u>

The directional gain of the antenna is less than 6dBi, please refer to the EUT internal photographs antenna photo.

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