

9.6 Spectrum bandwidth – 6 dB

Description:

Measurement of the 6 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter					
Detector:	Peak				
Sweep time:	Auto				
Resolution bandwidth:	1 - 5% of the DTS BW but not exceed 100 kHz				
Video bandwidth:	≥ 3 x RBW				
Span:	Complete signal				
Trace-Mode:	Max hold (allow trace to stabilize)				

Limits:

FCC	IC				
Spectrum Bandwidth – 6 dB					
Systems using digital modulation techniques may operate in the 5725 – 5825 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.					

Results:

Modulation	(6 dB bandwidth [MHz	1
Frequency	5725 MHz	5785 MHz	5825 MHz
OFDM / a – mode, 6 Mbps	11.36	11.33	11.34
OFDM / a – mode, 24 Mbps	11.31	11.29	11.30
OFDM / a – mode, 54 Mbps	11.30	11.31	11.33
OFDM / n – mode, MCS 0	11.94	11.91	11.93
OFDM / n – mode, MCS 4	11.87	11.87	11.89
OFDM / n – mode, MCS 7	11.90	11.89	11.89
Measurement uncertainty		± RBW	

Result: Passed



Plots:

Plot 1: lowest channel, a - mode, 6 Mbps

B Spectrum Ref Level 20.00 dBm RBW 100 kHz Att 30 dB 👄 SWT 10 s 👄 VBW 500 kHz Mode Auto Sweep ●1Pk View -0.08 dBm 5.74371010 GHz 11.356864314 MHz M1[1] 10 dBm-Occ Bw MI 0 dBm tal. de Havel L 1 -10 dBm -20 dBm -30 dBm 40 dBm سألاط -50 dBm -60 dBm -70 dBm CF 5.745 GHz 10001 pts Span 60.0 MHz

Date: 25.MAR.2013 11:41:35

Plot 2: lowest channel, a - mode, 24 Mbps



Date: 25.MAR.2013 12:59:50



Plot 3: lowest channel, a - mode, 54 Mbps



Plot 4: lowest channel, n – mode, MCS 0

Date: 25.MAR.2013 14:10:47

Plot 5: lowest channel, n - mode, MCS 4

Plot 6: lowest channel, n – mode, MCS 7

Date: 25.MAR.2013 15:36:23

Plot 7: middle channel, a – mode, 6 Mbps

Plot 8: middle channel, a - mode, 24 Mbps

Date: 25.MAR.2013 13:08:31

Plot 9: middle channel, a - mode, 54 Mbps

Plot 10: middle channel, n – mode, MCS 0

Date: 25.MAR.2013 14:29:49

Plot 11: middle channel, n - mode, MCS 4

Plot 12: middle channel, n – mode, MCS 7

Date: 25.MAR.2013 15:45:18

Plot 13: highest channel, a – mode, 6 Mbps

Plot 14: highest channel, a - mode, 24 Mbps

Date: 25.MAR.2013 13:17:31

Plot 15: highest channel, a – mode, 54 Mbps

Date: 25.MAR.2013 13:59:46

Plot 16: highest channel, n – mode, MCS 0

Date: 25.MAR.2013 14:38:40

Plot 17: highest channel, n - mode, MCS 4

Plot 18: highest channel, n – mode, MCS 7

Date: 25.MAR.2013 15:58:32

9.7 Spectrum bandwidth – 20 dB

Not performed! Tests according to manufacturer test plan!

9.8 Band edge compliance conducted

Not performed! Tests according to manufacturer test plan!

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9.9 Band edge compliance radiated

Plot 2: Upper band edge, OFDM / a - mode, Limit acc. costumer demand Part 15.247 (d) (conducted limit)

All out of band emissions on the bandedge are below 20 dBc

Plot 3: Lower band edge, OFDM / n – mode HT20, Limit acc. costumer demand Part 15.407

Plot 4: Upper band edge, OFDM / n - mode HT20, Limit acc. costumer demand Part 15.247 (d) (conducted limit)

All out of band emissions on the bandedge are below 20 dBc

Result: Not rated

9.10 TX spurious emissions conducted

Description:

Measurement of the conducted spurious emissions in transmit mode The measurement is performed at the lowest, middle and highest channel. The measurement is repeated for all modulations.

Measurement:

Measurement parameter						
Detector:	Peak					
Sweep time:	1s / 100 MHz					
Resolution bandwidth:	F < 1 GHz:100 kHzF > 1 GHz:100 kHz					
Video bandwidth:	F < 1 GHz: 500 kHz F > 1 GHz: 500 kHz					
Span:	9 kHz to 25 GHz					
Trace-Mode:	Max Hold					

Limits:

FCC	IC				
TX Spurious Emissions Conducted					
In any 100 kHz bandwidth outside the frequency band in w radiator is operating, the radio frequency power that is produ that in the 100 kHz bandwidth within the band that contains RF conducted or a radiated measurement. Attenuation be required	which the spread spectrum or digitally modulated intentional uced by the intentional radiator shall be at least 20 dB below is the highest level of the desired power, based on either an low the general limits specified in Section 15.209(a) is not				

Test report no.: 1-5579/12-02-33-B

Results: OFDM / a – mode

	TX Spurious Emissions Conducted						
	OFDM / a – mode						
f [MHz]		amplit emis [dE	ude of sion 8m]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results	
5745		See	olots!	30 dBm		Operating frequency	
No critic emission	al peaks detected s are below the -2	. All detec 0 dBc crit	eria.	-20 dBc (peak) -30 dBc (average)		complies	
5785		See	olots!	30 dBm		Operating frequency	
No critic emission	critical peaks detected. All detected sions are below the -20 dBc criteria.		-20 dBc (peak) -30 dBc (average)		complies		
5825		See	olots!	30 dBm		Operating frequency	
No critic emission	al peaks detected s are below the -2	aks detected. All detected below the -20 dBc criteria.		-20 dBc (peak)		complies	
				-30 dBc (average)			
Measu	urement uncertain	ty			± 3 dB		

Result: Passed

Results: OFDM / n – mode HT20

	TX Spurious Emissions Conducted					
	OFDM / n – mode HT20					
f [MHz]		ampliti emis [dB	ude of sion sm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5745		See p	olots!	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.		-20 dBc (peak)		complies		
			-30 dBc (average)			
5785		See p	olots!	30 dBm		Operating frequency
No critic emission	No critical peaks detected. All detected emissions are below the -20 dBc criteria.		-20 dBc (peak)		complies	
				-30 dBc (average)		
5825		See	olots!	30 dBm		Operating frequency
No critic emission	No critical peaks detected. All detected emissions are below the -20 dBc criteria.		-20 dBc (peak)		complies	
				-30 dBc (average)		
Measurement uncertainty				± 3 dB		

<u>Result:</u> Passed

Plots:

Plot 2: lowest channel, a - mode, 24 Mbps

Plot 3: lowest channel, a - mode, 54 Mbps

Plot 4: lowest channel, n – mode, MCS 0

Plot 5: lowest channel, n – mode, MCS 4

Plot 6: lowest channel, n – mode, MCS 7

Plot 7: middle channel, a – mode, 6 Mbps

Plot 8: middle channel, a - mode, 24 Mbps

Plot 9: middle channel, a – mode, 54 Mbps

Plot 10: middle channel, n – mode, MCS 0

Plot 11: middle channel, n – mode, MCS 4

Plot 12: middle channel, n – mode, MCS 7

Plot 13: highest channel, a – mode, 6 Mbps

Plot 14: highest channel, a - mode, 24 Mbps

Plot 15: highest channel, a - mode, 54 Mbps

Plot 16: highest channel, n – mode, MCS 0

Plot 17: highest channel, n - mode, MCS 4

Plot 18: highest channel, n – mode, MCS 7

9.11 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at the lowest, middle and highest channel. The measurement is repeated for all modulations.

Measurement:

Measurement parameter						
Detector:	Peak / Quasi Peak / RMS					
Sweep time:	Auto					
Resolution bandwidth:	F > 1 GHz: 1 MHz F < 1 GHz: 100 kHz					
Video bandwidth:	Sweep:100 kHzRemeasurement:10 Hz / 3 MHz					
Span:	30 MHz to 25 GHz					
Trace-Mode:	Max Hold					
Measured Modulation	 ☑ OFDM a – mode ☑ OFDM n – mode HT20 ☑ OFDM n – mode HT40 					

The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation.

Limits:

FCC			IC			
TX Spurious Emissions Radiated						
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intention radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB be that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also com- with the radiated emission limits specified in §15.209(a) (see §15.205(c)).						
Frequency (MHz)	Field Strength (dBµV/m) Measurement distance					
30 - 88	30	0.0	10			
88 – 216	88 – 216 33.5 10		10			
216 – 960	36	5.0	10			
Above 960	54	.0	3			

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Results: OFDM / a - mode

TX Spurious Emissions Radiated [dBµV/m]								
			OF	DM / a – mod	le	_		
	5745 MHz			5785 MHz		5825 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissi take a loc	ons below 1 (ok at the table 1 GHz plot.	GHz, please below the	For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. For emissions below 1 take a look at the table 1 GHz plot.			ons below 1 G k at the table 1 GHz plot.	Hz, please below the	
All detecte 1 GHz are	ed peak emiss below the av	sions above erage limit!	All detected peak emissions aboveAll detected peak emissions ab1 GHz are below the average limit!1 GHz are below the average l			ions above erage limit!		
Measurement uncertainty					± 3	dB		

Result: Passed

Results: OFDM / n – mode HT20

TX Spurious Emissions Radiated [dBµV/m]								
			OFDM	/l / n – mode H	HT20	_		
5745 MHz 5785 MHz					5825 MHz			
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	F [MHz] Detector Level [dBµV/m]			Detector	Level [dBµV/m]
For emissi take a loc	ons below 1 (ok at the table 1 GHz plot.	GHz, please below the	For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. For emissions below 1 GHz take a look at the table be 1 GHz plot.			Hz, please below the		
All detecte 1 GHz are	ed peak emiss below the av	sions above erage limit!	All detected peak emissions above 1 GHz are below the average limit! All detected peak emissions a 1 GHz are below the average			ions above erage limit!		
Measurement uncertainty ± 3 dB								

Result: Passed

Plots: OFDM / a - mode

Plot 1: Channel 149, 30 MHz to 1 GHz, vertical & horizontal polarization

Common Information

EUT:
Serial Number:
Test Description:
Operating Conditions:
Operator Name:
Comment:

RFM121LW Imei:990002430036317 FCC part 15 C class B @ 10 m w-lan a mode CH149 6Mbps Wolsdorfer battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electr	ic Field (NOS)			
Receiver:	[ESC				
Level Unit:	dBµV				
Subrange	Step Size	Detectors	IF BW	Meas.	Preamp
				Time	
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidt h (kHz)	Height (cm)	Polarizatio n	Azimut h (deg)	Corr. (dB)	Margi n (dB)	Limit (dBµV/m)	Comment
47.026050	14.6	1000.0	120.000	98.0	V	88.0	13.3	15.4	30.0	
231.219300	8.3	1000.0	120.000	170.0	Н	280.0	12.7	27.7	36.0	
318.788100	11.3	1000.0	120.000	170.0	V	0.0	15.1	24.7	36.0	
578.797650	17.0	1000.0	120.000	98.0	Н	280.0	20.2	19.0	36.0	
734.597700	20.1	1000.0	120.000	132.0	Н	10.0	23.3	15.9	36.0	
912.604200	22.0	1000.0	120.000	170.0	Н	260.0	25.2	14.0	36.0	

Plot 2: Channel 149, 1 GHz to 12.75 GHz, vertical & horizontal polarization

Plot 3: Channel 149, 12.75 GHz to 18 GHz, vertical & horizontal polarization

Date: 25.MAR.2013 13:34:32

Plot 5: Channel 149, 26 GHz to 40 GHz, vertical & horizontal polarization

Date: 25.MAR.2013 14:00:17

Date: 25.MAR.2013 13:52:53

Plot 6: Channel 157, 30 MHz to 1 GHz, vertical & horizontal polarization

Common Information

EUT:	RFM121LW
Serial Number:	Imei:990002430036317
Test Description:	FCC part 15 C class B @ 10 m
Operating Conditions:	w-lan a mode CH157 6Mbps
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:
Receiver:
Level Unit:

Electric Field (NOS) [ESCI 3] dBµV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidt h (kHz)	Height (cm)	Polarizatio n	Azimut h (deg)	Corr. (dB)	Margi n (dB)	Limit (dBµV/m)	Comment
35.047200	12.0	1000.0	120.000	161.0	V	260.0	13.0	18.0	30.0	
45.593550	10.0	1000.0	120.000	120.0	V	180.0	13.3	20.0	30.0	
99.085950	7.0	1000.0	120.000	170.0	Н	100.0	11.8	26.5	33.5	
560.092800	16.4	1000.0	120.000	170.0	V	190.0	19.7	19.6	36.0	
713.886450	19.7	1000.0	120.000	170.0	Н	268.0	22.8	16.3	36.0	
931.351650	22.1	1000.0	120.000	105.0	Н	260.0	25.3	13.9	36.0	