# **FCC Test Report**

FCC ID : D6XIG7200

Equipment : Smart Phone Gateway

Model No. : IG7200
Brand Name : MOCET

Applicant : TECOM CO.,LTD.

Address : 23, R&D Road 2 Science-Based Industrial Park

Hsin-Chu Taiwan R.O.C.

Standard : 47 CFR FCC Part 15.247

Received Date : May 24, 2013

Tested Date : May 24 ~ May 30, 2013

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Approved & Reviewed by:

Gary Chang / Manager

Iac-MRA



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## **Release Record**

Report No.	Version	Description	Issued Date
FR352406	Rev. 01	Initialissue	Jun. 04, 2013

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# **Summary of Test Results**

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.448MHz 40.24 (Margin -6.66dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 125.00, 750.01MHz 42.49, 44.99 (Margin -1.01dB) - QP	Pass
15.247(b)(3)	Fundamental Emission Output Power	Power[dBm]: 11b: 22.01 11g: 26.67 HT20: 26.49 HT40: 24.51	Pass
15.247(a)(2)	6dB Bandwidth	Meet the requirement of limit	Pass
15.247(e)	Power Spectral Density	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

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## 1 General Description

## 1.1 Information

## 1.1.1 Specification of the Equipment under Test (EUT)

RF General Information									
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N <sub>TX</sub> )	Data Rate / MCS				
2400-2483.5	b	2412-2462	1-11 [11]	2	1-11 Mbps				
2400-2483.5	g	2412-2462	1-11 [11]	2	6-54 Mbps				
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	2	MCS 0-15				
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	2	MCS 0-15				

Note 1: RF output power specifies that Maximum Peak Conducted Output Power.

Note 2: 802.11b uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.

Note 3: 802.11g/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.

#### 1.1.2 Antenna Details

Ant. No.	Туре	Gain (dBi)	Connector	Remark
1	Dipole	3.04	UFL	
2	PIFA	3.5	UFL	

## 1.1.3 EUT Operational Condition

Supply Voltage	M	AC mains	DC	
Type of DC Source		Internal DC supply	External DC adapter	Battery

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1.1.4 Accessories

	Accessories					
No. Equipment Description						
		Brand Name: Leader				
		Model Name: MU06-E120050-A1				
1	AC Adapter	Power Rating: I/P: 100-240Vac, 0.2A O/P: 12Vdc, 0.5A				
		Power Line: 1.5m non-shielded cable with one core				
2	RJ45 cable	1.8m non-shielded cable w/o core				

### 1.1.5 Channel List

Frequenc	y band (MHz)	2400	)~2483.5		
802.11 b	/ g / n HT20	802.11n HT40			
Channel	Channel Frequency(MHz)		Frequency(MHz)		
1	2412	3	2422		
2	2417	4	2427		
3	2422	5	2432		
4	2427	6	2437		
5	2432	7	2442		
6	2437	8	2447		
7	2442	9	2452		
8	2447				
9	2452				
10	2457				
11	2462				

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## 1.1.6 Test Tool and Duty Cycle

Test tool	ART V0_9_b21_ar928xALL
Duty Cycle Of Test Signal (%)	100.00% - IEEE 802.11b 99.64% - IEEE 802.11g 100.00% - IEEE 802.11n (HT20) 99.20% - IEEE 802.11n (HT40)
Duty Factor	0.00 - IEEE 802.11b 0.02 - IEEE 802.11g 0.00 - IEEE 802.11n (HT20) 0.03 - IEEE 802.11n (HT40)

## 1.1.7 Power Setting

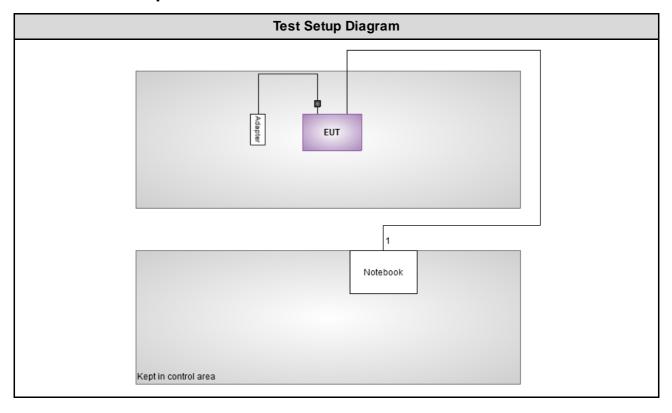
		Test Frequency (MHz)						
Modulation Mode	b / g / n HT20				n HT40  2437    20.5  15.5			
	2412	2437	2462	2422	2437	2462		
b	23.5	23.5	20.5	-	-	-		
g	20.5	23	17.5	-	-	-		
n (HT20)	20.5	23	17.5	-	-	-		
n (HT40)	-	-	-	18.5	20.5	15.5		

## 1.2 Local Support Equipment List

	Support Equipment List								
No. Equipment Brand Model S/N FCC ID Signal cable / Length									
1	Notebook	DELL	E6430		DoC	RJ45, 1.8m non-shielded w/o core.			

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## 1.3 Test Setup Chart



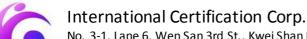
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## 1.4 The Equipment List

EMI	Conducted Emission									
Test Site	Conduction room 1 / (CO01-WS)									
Instrument	Manufacturer Model No. Serial No. Calibration Date Calibration Un									
EMC Receiver	R&S	ESCS 30	100169	Dec. 12, 2012	Dec. 11, 2013					
LISN	SCHWARZBECK MESS-ELEKTRONIK	Schwarzbeck 8127	8127-667	Dec. 04, 2012	Dec. 03, 2013					
LISN (Support Unit)	SCHWARZBECK MESS-ELEKTRONIK	Schwarzbeck 8127	8127-666	Dec. 04, 2012	Dec. 03, 2013					
ISN	TESEQ	ISN T800	23342	Feb. 17, 2013	Feb. 16, 2014					
ISN	TESEQ	ISN T400	21653	Jun. 22, 2012	Jun. 21, 2013					
ISN	TESEQ	ISN T8-Cat6	27262	Sep. 17, 2012	Sep. 16, 2013					
ISN	TESEQ	ISN ST08	22589	Jan. 24, 2013	Jan. 23, 2014					
RF Current Probe	FCC	F-33-4	121630	Dec. 04, 2012	Dec. 03, 2013					
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Dec. 25, 2012	Dec. 24, 2013					
ESH3-Z6 V-Network	ESH3-Z6 V-Network R&S ESH3-Z6 100920 Nov. 21, 2012 Nov. 20, 2013									
Note: Calibration Interv	val of instruments listed	above is one year.								

ЕМІ	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
3m semi-anechoic chamber	RIKEN	SAC-03	03CH01-WS	Jan. 04, 2013	Jan. 03, 2014
Amplifier	Burgeon	BPA-530	100219	Nov 28, 2012	Nov. 27, 2013
Amplifier	Agilent	83017A	MY39501308	Dec. 18, 2012	Dec. 17, 2013
Bilog Antenna	ScHwarzbeck	VULB9168	VULB9168-522	Jan. 11, 2013	Jan. 10, 2014
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Feb. 18, 2013	Feb. 17, 2014
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Jan. 14, 2013	Jan. 13, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 25, 2012	Dec. 24, 2013
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 25, 2012	Dec. 24, 2013
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 25, 2012	Dec. 24, 2013
RF Cable-R03m	Woken	CFD400NL-LW	CFD400NL-001	Dec. 25, 2012	Dec. 24, 2013
RF Cable-R10m	Woken	CFD400NL-LW	CFD400NL-002	Dec. 25, 2012	Dec. 24, 2013
Spectrum Analyzer	R&S	FSV40	101498	Jan. 24, 2013	Jan. 23, 2014
Receiver	ROHDE&SCHWARZ	ESR3	101658	Jan. 30, 2013	Jan. 29, 2014
control	EM Electronics	EM1000	60612	N/A	N/A

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RF	RF Conducted				
Test Site	RF Conducted (TH01-	WS)			
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV 40	101486	Nov. 14, 2012	Nov. 13, 2013
Spectrum Analyzer	R&S	FSP 40	100593	Aug. 14, 2012	Aug. 13, 2013
DC Power Source	G.W.	GPC-6030D	C671845	Jun. 19, 2012	Jun. 18, 2013
AC Power Source	G.W	APS-9102	EL920581	Jul. 02, 2012	Jul. 01, 2013
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	Nov 21, 2012	Nov 20, 2013
Signal Generator	R&S	SMR40	100116	Jun. 26, 2012	Jun. 25, 2013
Power Sensor	Anritsu	MA2411B	1027452	Sep. 08, 2012	Sep. 07, 2013
Power Meter	Anritsu	ML2495A	1124009	Sep. 08, 2012	Sep. 07, 2013
RF Cable-2m	HUBER+SUHNER	SUCOFLEX_104	SN 345675/4	NA	NA
RF Cable-3m	HUBER+SUHNER	SUCOFLEX_104	SN 345669/4	NA	NA

#### 1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247

ANSI C63.10-2009

FCC KDB 558074 D01 DTS Meas Guidance v03

FCC KDB 662911 D01 Multiple Transmitter Output v02

Note: The EUT has been tested and complied with FCC part 15B requirement. FCC Part 15B test results are issued to another report.

## 1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty					
Parameters	Uncertainty				
Bandwidth	±35.286 Hz				
Conducted power	±0.536 dB				
Frequency error	±35.286 Hz				
Temperature	±0.3 °C				
Conducted emission	±2.946 dB				
AC conducted emission	±2.43 dB				
Radiated emission	±2.49 dB				

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# 2 Test Configuration

# 2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	21°C / 55%	Skys Huang
Radiated Emissions	03CH01-WS	25°C / 65%	Aska Huang Haru Yang
RF Conducted	TH01-WS	24°C / 63%	Brad Wu

FCC site registration No.: 657002IC site registration No.: 10807A-1

## 2.2 The Worst Test Modes and Channel Details

The Worst Test Modes and Channel Details				
Test Item(s)	Conducted Emissions			
Measurement Method	Conducted Measurement			
Modulation, Data rate	11g/6Mbps			
Test channel (MHz)	2437			
Test Condition	Continous transmitting			

The Worst Test Modes and Channel Details				
Test Item(s)	Fundamental Emission Output Power 6dB bandwidth Power spectral density			
Measurement Method	Conducted Measurement			
Modulation, Data rate	11b/1Mbps, 11g/6Mbps, HT20/MCS 0, HT40/MCS 0			
Test channel (MHz)	11b, 11g, HT20: 2412, 2437, 2462 HT40: 2422, 2437, 2452			
Test Condition	Continoustransmitting			

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International Certification Corp.

No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.
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The Worst Test Modes and Channel Details				
Test Item(s)	Radiated emission (below 1GHz)			
Measurement Method	Radiated Measurement			
Modulation, Data rate	11g/6Mbps			
Test channel (MHz)	2437			
Test Condition	Continous transmitting			
Test Item(s)	Radiated emission (above 1GHz)			
Measurement Method	Radiated Measurement			
Modulation, Data rate	11b/1Mbps, 11g/6Mbps, HT20/MCS 0, HT40/MCS 0			
Test channel (MHz)	11b, 11g, HT20: 2412, 2437, 2462 HT40: 2422, 2437, 2452			
Test Condition	Continous transmitting			

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## 3 Transmitter Test Results

#### 3.1 Conducted Emissions

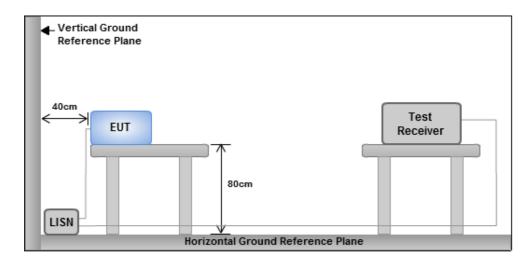
#### 3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit						
Frequency Emission (MHz) Quasi-Peak Average						
0.15-0.5	66 - 56 *	56 - 46 *				
0.5-5	56	46				
5-30 60 50						
Note 1: * Decreases with the logarithm of the frequency.						

#### 3.1.2 Test Procedures

- 1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
- The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
- 3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
- 4. This measurement was performed with AC 120V/60Hz

#### 3.1.3 Test Setup



Note: 1. Support units were connected to second LISN.

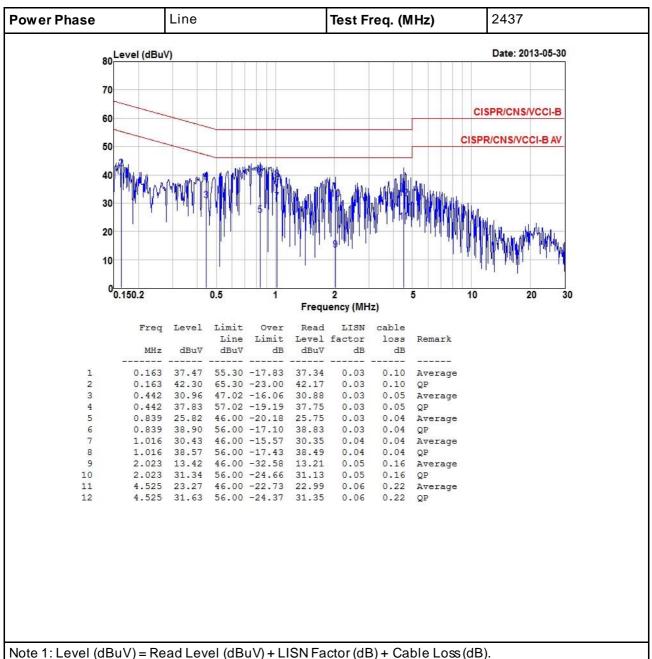
Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

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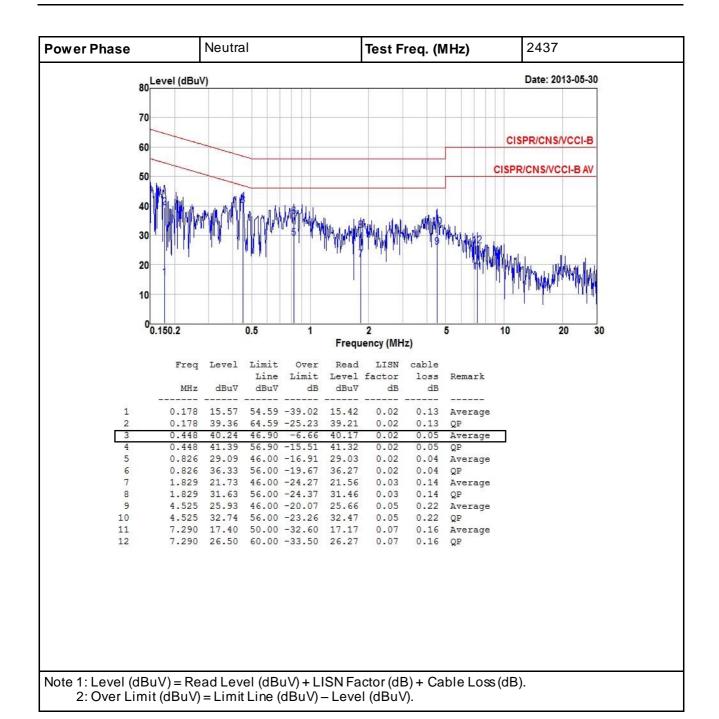
#### **Test Result of Conducted Emissions**



2: Over Limit (dBuV) = Limit Line (dBuV) - Level (dBuV).

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## 3.2 6dB and Occupied Bandwidth

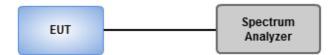
#### 3.2.1 Limit of 6dB Bandwidth

The minimum 6dB bandwidth shall be at least 500 kHz.

#### 3.2.2 Test Procedures

- 1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
- 2. Detector = Peak, Trace mode = max hold.
- 3. Sweep = auto couple, Allow the trace to stabilize.
- 4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

#### 3.2.3 Test Setup



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## 3.2.4 Test Result of 6dB and Occupied Bandwidth

Modulation	N	Freq. (MHz)		6dB Bandwidth (MHz)			Limit (kHz)	
Mode	N <sub>TX</sub>	rieq. (Winz)	Chain 0	Chain 1	Chain 2	Chain 3	Lilliit (Kriz)	
11b	2	2412	10.09	10.09			500	
11b	2	2437	10.09	10.09			500	
11b	2	2462	10.09	9.10			500	
11 g	2	2412	16.35	16.41			500	
11 g	2	2437	16.35	16.35			500	
11 g	2	2462	16.35	16.35			500	
HT20	2	2412	17.57	17.62			500	
HT20	2	2437	17.62	17.62			500	
HT20	2	2462	17.62	17.62			500	
HT40	2	2422	36.29	36.29			500	
HT40	2	2437	36.41	36.41			500	
HT40	2	2452	36.41	36.41			500	



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Modulation	Eroa (MUz)	99% Occupied Bandwidth (MHz)			
Mode	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3
11b	2412	14.07	14.18		
11b	2437	14.24	14.12		
11b	2462	14.12	14.01		
11g	2412	17.54	17.13		
11g	2437	18.47	18.29		
11g	2462	17.42	17.08		
HT20	2412	18.52	18.41		
HT20	2437	19.10	19.16		
HT20	2462	18.47	18.35		
HT40	2422	39.02	38.32		
HT40	2437	39.25	38.78		
HT40	2452	38.78	38.44		



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### 3.3 RF Output Power

### 3.3.1 Limit of RF Output Power

Cor	nduct	ted power shall not exceed 1 Watt.				
×	Antenna gain <= 6dBi, no any corresponding reduction is in output power limit.					
	Ant	enna gain > 6dBi				
		Non Fixed, point to point operations. The conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB				
		Fixed, point to point operations Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point Operations, maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.				
		Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point				

#### 3.3.2 Test Procedures

$\boxtimes$	Maximum	<b>PeakConducted</b>	Output Dower
لكا	Maximum	PeakConducted	Output Power

#### ☐ Spectrum analyzer

- 1. Set RBW = 1MHz, VBW = 3MHz, Detector = Peak.
- 2. Sweep time = auto, Trace mode = max hold, Allow trace to fully stabilize.

operations, no any corresponding reduction is in transmitter peak output power

3. Use the spectrum analyzer channel power measurement function with the band limits set equal to the DTS bandwidth edges.

#### 

- A broadband Peak RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.
- Maximum Conducted Output Power (For reference only)

#### ☐ Spectrum analyzer

- 1. Set RBW = 1MHz, VBW = 3MHz, Detector = RMS.
- 2. Set the sweep time to: ≥10 x (number of measurement points in sweep) x (maximum data rate per stream).
- 3. Perform the measurement over a single sweep.
- 4. Use the spectrum analyzer's band power measurement function with band limits set equal to the EBW(26dBc) band edges.

#### ☑ Power meter

1. A broadband Average RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

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## 3.3.3 Test Setup



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## 3.3.4 Test Result of Maximum Output Power

Modulation N <sub>TX</sub>	N <sub>TX</sub>	Freq. (MHz)	Peak conducted output power (dBm)				Total Power	Total Power	Limit
			Chain 0	Chain 1	Chain 2	Chain 3	(mW)	(dBm)	(dBm)
11b	2	2412	18.26	19.11			148.46	21.72	30
11b	2	2437	18.69	19.28			158.68	22.01	30
11b	2	2462	16.67	16.91			95.54	19.80	30
11 g	2	2412	21.53	22.31			312.45	24.95	30
11 g	2	2437	23.41	23.9			464.75	26.67	30
11 g	2	2462	20.14	20.35			211.67	23.26	30
HT20	2	2412	21.35	22.36			308.65	24.89	30
HT20	2	2437	23.26	23.69			445.72	26.49	30
HT20	2	2462	20.02	20.16			204.21	23.10	30
HT40	2	2422	19.83	19.92			194.34	22.89	30
HT40	2	2437	21.46	21.53			282.19	24.51	30
HT40	2	2452	17.85	18.02			124.34	20.95	30

Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Conducted (average) output power (dBm)				Total Power	Total Power	Limit
Wode			Chain 0	Chain 1	Chain 2	Chain 3	(mW)	(dBm)	(dBm)
11b	2	2412	16.16	16.95			90.85	19.58	30
11b	2	2437	16.72	17.04			97.57	19.89	30
11b	2	2462	14.52	14.78			58.37	17.66	30
11g	2	2412	14.02	14.86			55.85	17.47	30
11g	2	2437	17.02	17.36			104.80	20.20	30
11 g	2	2462	11.71	11.92			30.38	14.83	30
HT20	2	2412	13.56	13.91			47.30	16.75	30
HT20	2	2437	16.68	17.01			96.79	19.86	30
HT20	2	2462	11.14	11.42			26.87	14.29	30
HT40	2	2422	11.68	11.54			28.98	14.62	30
HT40	2	2437	14.21	14.27			53.09	17.25	30
HT40	2	2452	9.74	9.93			19.26	12.85	30

Note: Conducted average output power is for reference only.

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## 3.4 Power Spectral Density

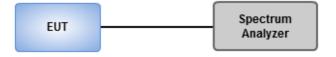
#### 3.4.1 Limit of Power Spectral Density

Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

#### 3.4.2 Test Procedures

- Maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit.
  - 1. Set the RBW = 30kHz, VBW = 100kHz.
  - 2. Detector = Peak, Sweep time = auto couple.
  - 3. Trace mode = max hold, allow trace to fully stabilize.
  - 4. Use the peakmarker function to determine the maximum amplitude level.
- ☐ Maximum (average) conducted output power was used to demonstrate compliance to the fundamental output power limit.
  - 1. Set the RBW = 100kHz, VBW = 300kHz.
  - 2. Detector = RMS, Sweep time = auto couple.
  - 3. Set the sweep time to: ≥ 10 x (number of measurement points in sweep) x (maximum data rate per stream).
  - 4. Perform the measurement over a single sweep.
  - 5. Use the peakmarker function to determine the maximum amplitude level.\

#### 3.4.3 Test Setup

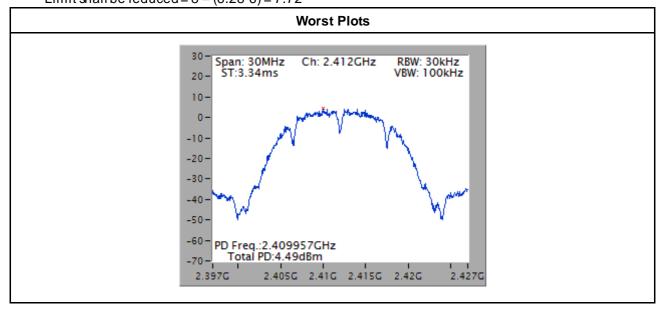


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### 3.4.4 Test Result of Power Spectral Density

Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Total Power Spectral Density (dBm/30kHz)	Limit (dBm/3kHz)
11b	2	2412	4.49	7.72
11b	2	2437	4.46	7.72
11b	2	2462	1.35	7.72
11 g	2	2412	-0.22	7.72
11 g	2	2437	2.87	7.72
11 g	2	2462	-2.38	7.72
HT20	2	2412	-1.02	7.72
HT20	2	2437	2.47	7.72
HT20	2	2462	-3.29	7.72
HT40	2	2422	-5.76	7.72
HT40	2	2437	-2.62	7.72
HT40	2	2452	-7.61	7.72

Note: Directional gain =  $10 \log[(10^{3.04/20} + 10^{3.5/20})^2/2] = 6.28 \text{ dBi} > 6 \text{dBI}$ Limit shall be reduced = 8 - (6.28-6) = 7.72



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## 3.5 Unwanted Emissions into Restricted Frequency Bands

#### 3.5.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit							
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)				
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300				
0.490~1.705	24000/F(kHz)	33.8 - 23	30				
1.705~30.0	30	29	30				
30~88	100	40	3				
88~216	150	43.5	3				
216~960	200	46	3				
Above 960	500	54	3				

#### Note 1

Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

#### 3.5.2 Test Procedures

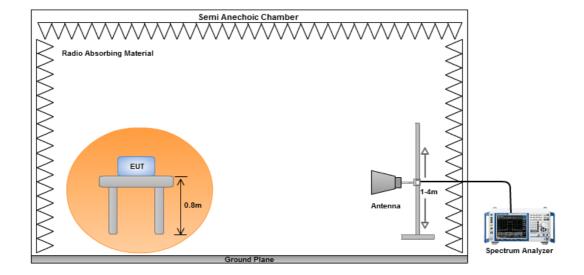
- 1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at a height of 0.8 m test table above the ground plane.
- 2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
- 3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

#### Note:

- 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
- 2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
- 3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

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## 3.5.3 Test Setup

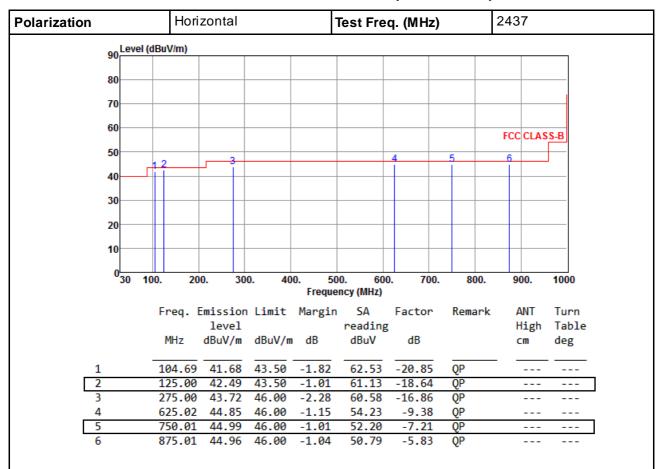


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Tel: 886-3-271-8666 Fax: 886-3-318-0155

### 3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

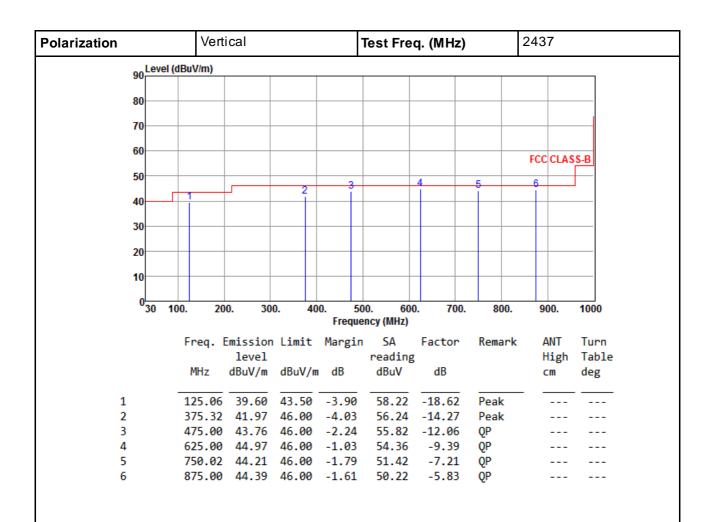


Note 1: Level (dBuV/m) = Read Level (dBuV/m) + Antenna Factor (dB) + Cable Loss (dB) - Preamp Factor (dB).2: Over Limit (dBuV/m) = Limit Line (dBuV/m) - Level (dBuV/m).

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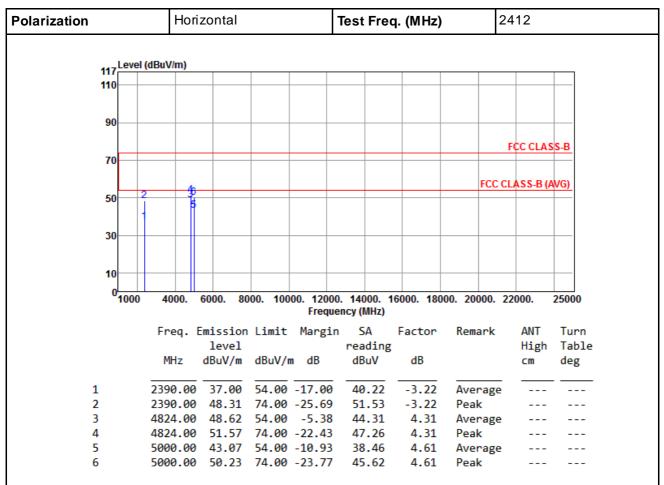
Note 1: Level (dBuV/m) = Read Level (dBuV/m) + Antenna Factor (dB) + Cable Loss (dB) - Preamp Factor (dB).2: Over Limit (dBuV/m) = Limit Line (dBuV/m) - Level (dBuV/m).

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### 3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11b



Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

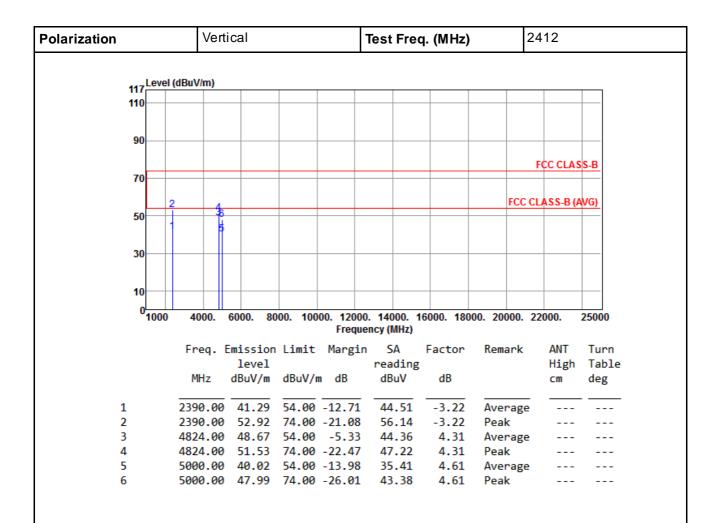
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

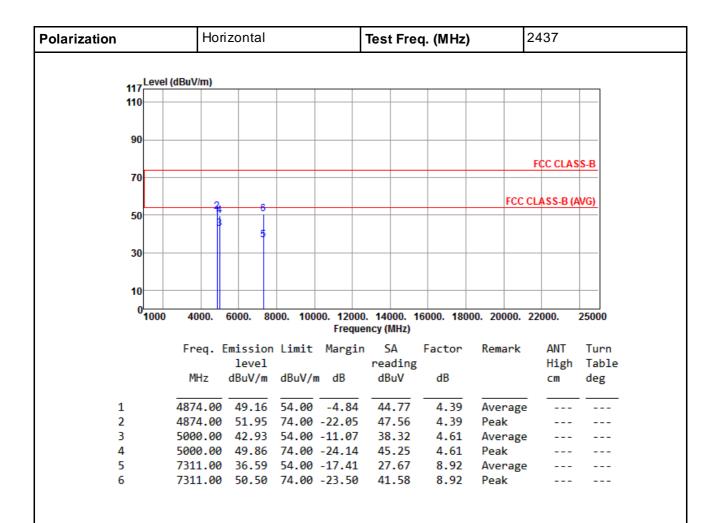
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

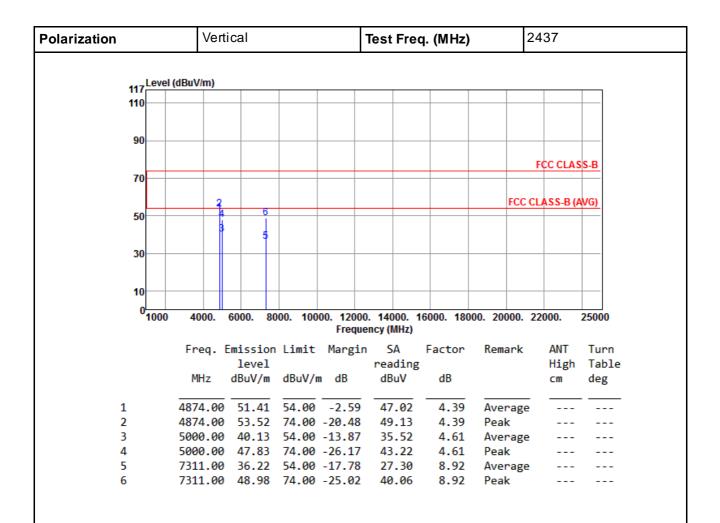
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Horizontal 2462 **Polarization** Test Freq. (MHz) 117 Level (dBuV/m) 110 90 FCC CLASS-B 70 FCC CLASS-B (AVG) 50 30 10 <sup>0</sup>1000 8000. 10000. 12000. 14000. 16000. 18000. 20000. 22000. 25000 Frequency (MHz) Freq. Emission Limit Margin SA Factor Remark ANT Turn Table level reading High dBuV/m dBuV/m dB MHz dBuV dB cmdeg 2483.50 38.40 54.00 -15.60 41.23 -2.83 Average 1 2 2483.50 49.90 74.00 -24.10 52.73 -2.83 Peak 3 4924.00 47.79 54.00 -6.21 43.31 4.48 Average 4 4924.00 51.11 74.00 -22.89 46.63 4.48 Peak 5 5000.00 43.16 54.00 -10.84 38.55 4.61 Average 6 5000.00 49.87 74.00 -24.13 45.26 4.61 Peak 7 7386.00 36.16 54.00 -17.84 27.18 8.98 Average 8 7386.00 49.28 74.00 -24.72 8.98 40.30 Peak

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

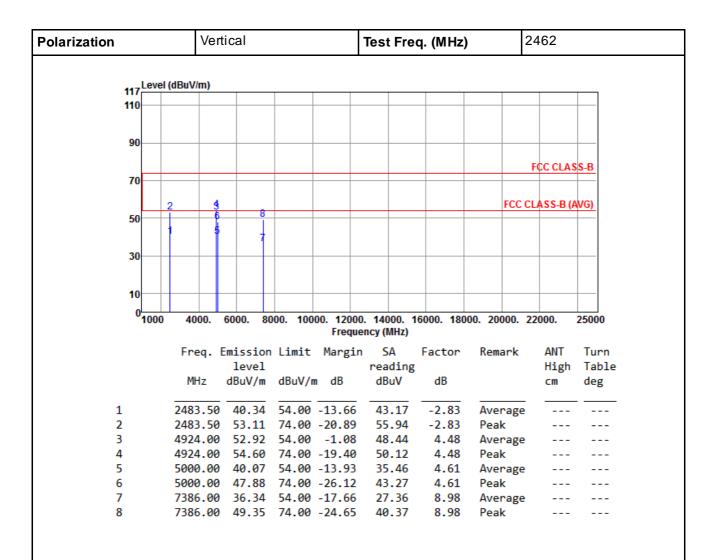
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

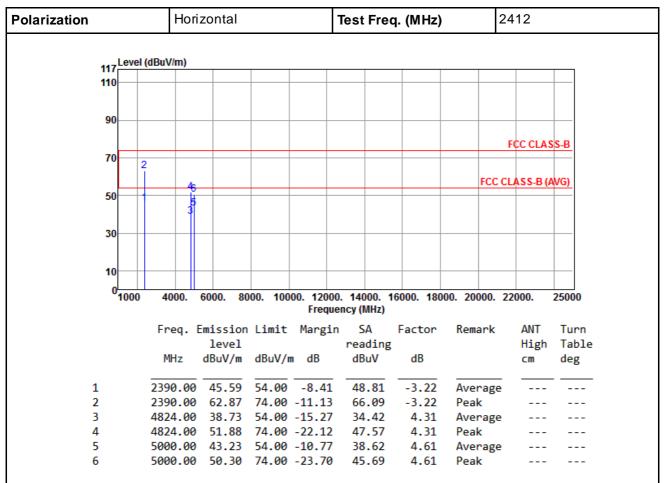
Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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## 3.5.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11g



Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

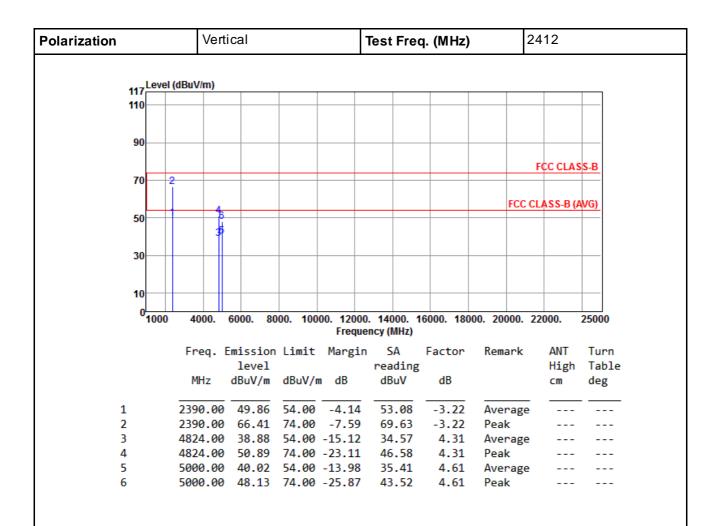
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

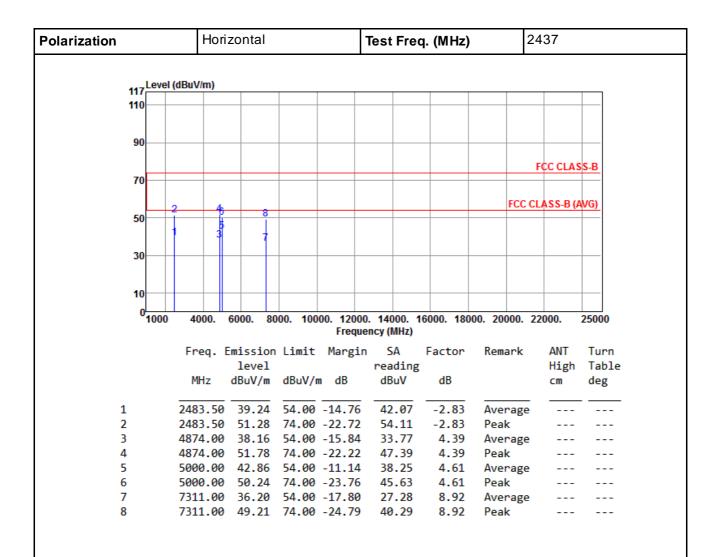
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

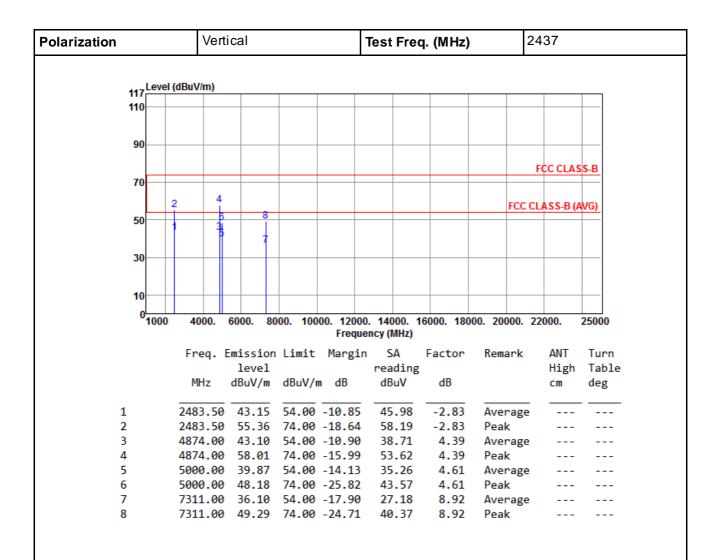
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

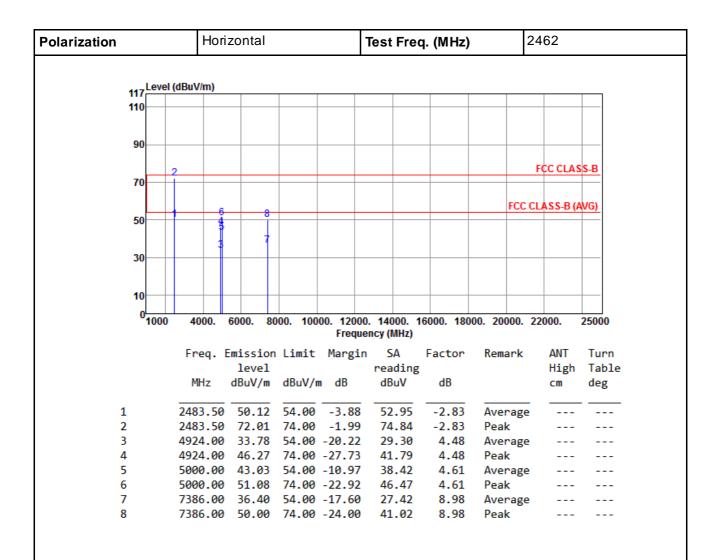
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

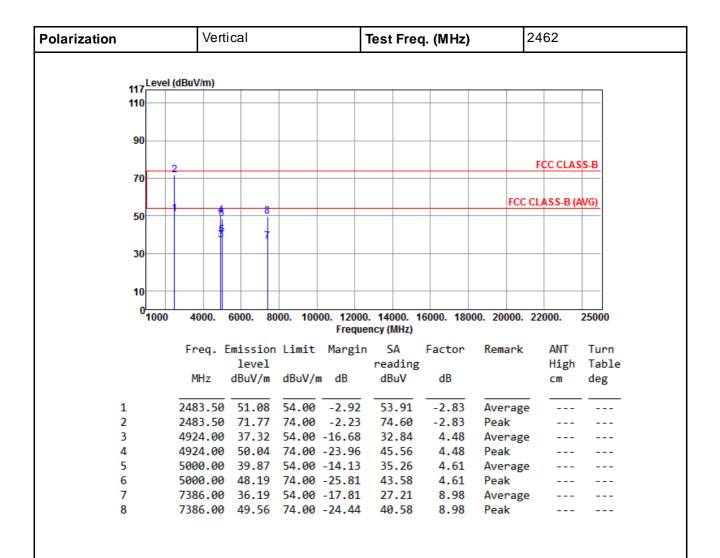
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

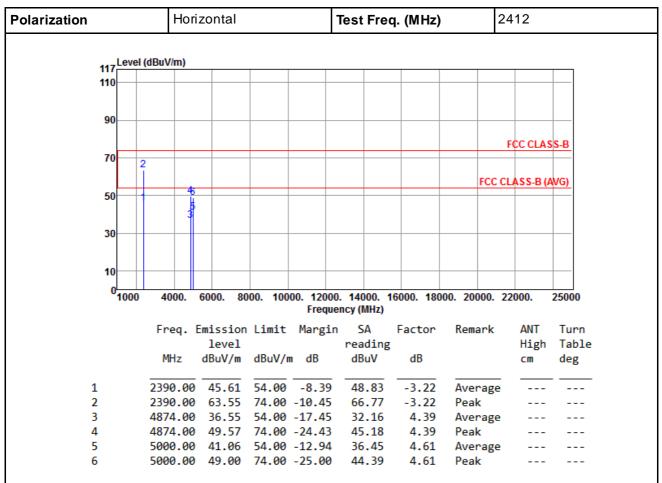
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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# 3.5.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT20



Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

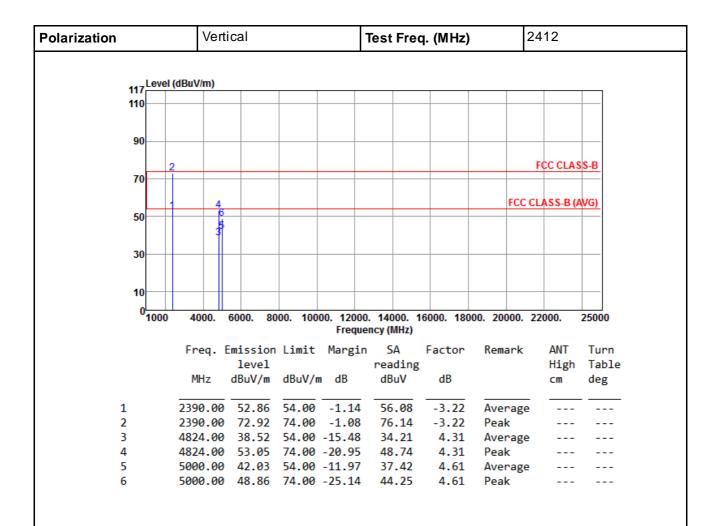
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

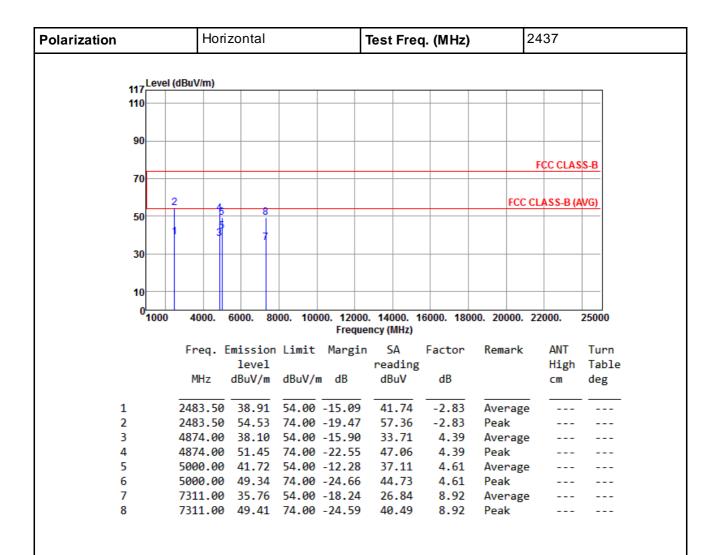
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Vertical 2437 **Polarization** Test Freq. (MHz) Level (dBuV/m) 117 110 90 FCC CLASS-B 70 FCC CLASS-B (AVG) 50 30 10 <sup>0</sup>1000 4000. 6000. 8000. 10000. 12000. 14000. 16000. 18000. 20000. 22000. 25000 Frequency (MHz) ANT SA Turn Freq. Emission Limit Margin Factor Remark Table reading High level dBuV MHz dBuV/m dBuV/m dB dB deg cm-2.83 2483.50 42.29 54.00 -11.71 45.12 Average 1 ------74.00 -15.91 2 2483.50 58.09 60.92 -2.83 Peak 3 4874.00 40.74 54.00 -13.26 36.35 4.39 Average 4 4874.00 55.19 74.00 -18.81 50.80 4.39 Peak 5 5000.00 42.81 54.00 -11.19 38.20 4.61 Average 6 5000.00 49.39 74.00 -24.61 44.78 4.61 Peak ---7 27.08 8.92 7311.00 36.00 54.00 -18.00 Average 8 7311.00 50.65 74.00 -23.35 41.73 8.92 Peak

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

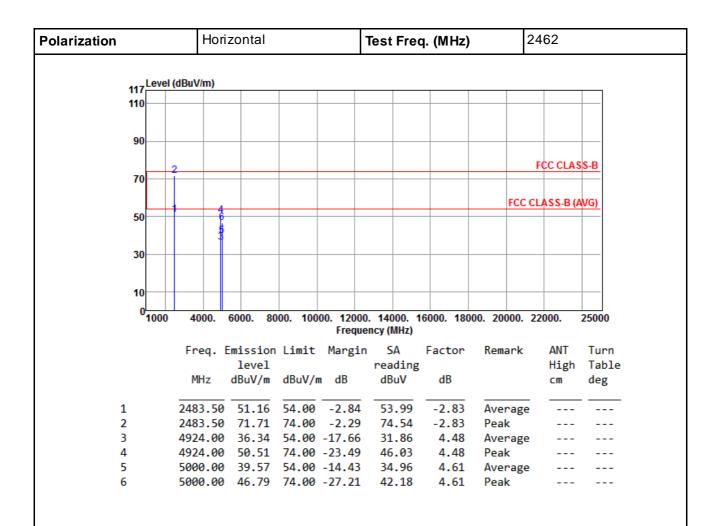
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Vertical 2462 **Polarization** Test Freq. (MHz) Level (dBuV/m) 117 110 90 FCC CLASS-B 70 FCC CLASS-B (AVG) 50 30 10 <sup>0</sup>1000 8000. 10000. 12000. 14000. 16000. 18000. 20000. 22000. 4000. 6000. 25000 Frequency (MHz) ANT Freq. Emission Limit Margin SA Factor Remark Turn reading High Table level MHz dBuV/m dBuV/m dB dBuV dB deg cm1 2483.50 51.39 54.00 -2.61 54.22 -2.83 Average 2 2483.50 72.82 74.00 -1.18 75.65 -2.83 Peak 3 4924.00 38.42 54.00 -15.58 33.94 4.48 Average 4 4924.00 52.60 74.00 -21.40 48.12 4.48 Peak 5 5000.00 41.46 54.00 -12.54 36.85 4.61 Average 6 5000.00 47.65 74.00 -26.35 4.61 43.04 Peak

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

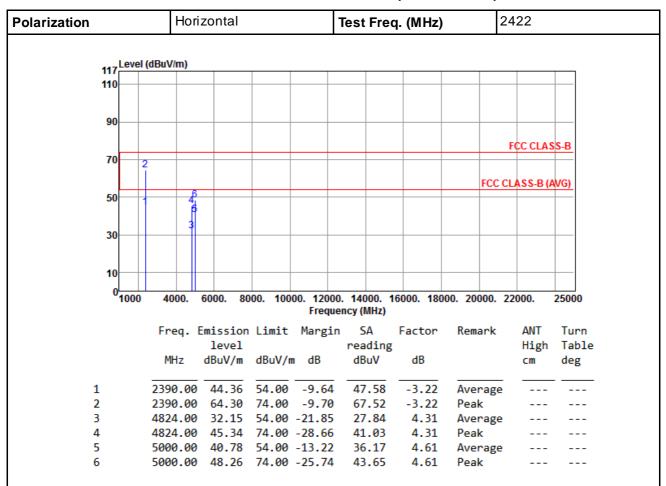
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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#### 3.5.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT40



Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit. Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in

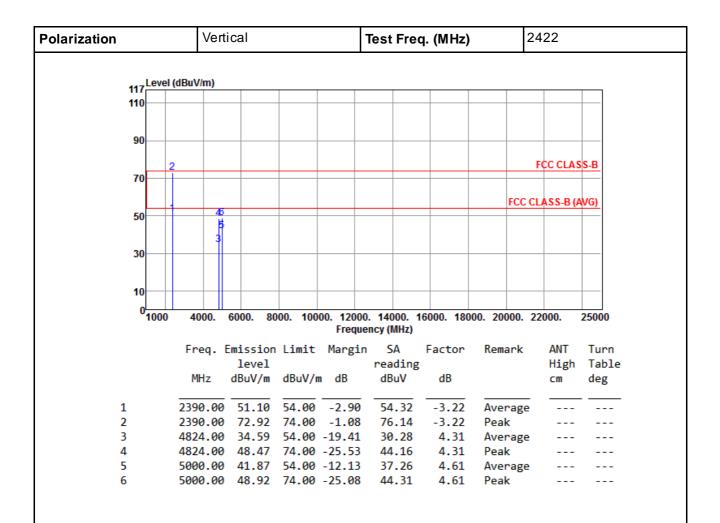
addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

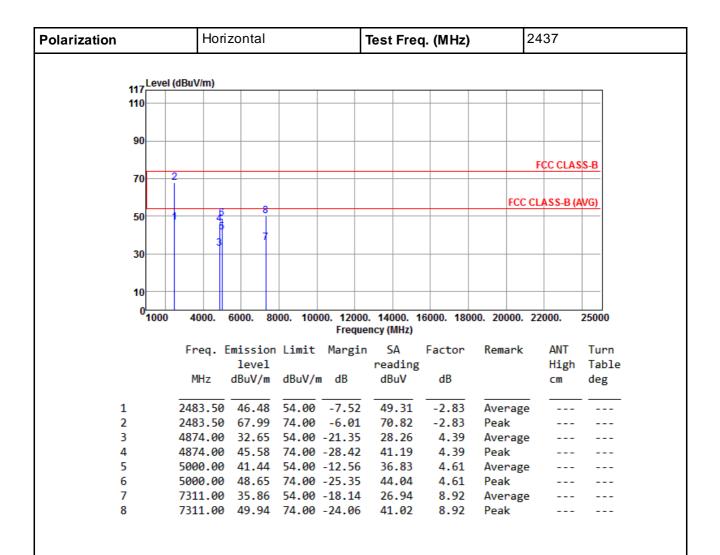
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

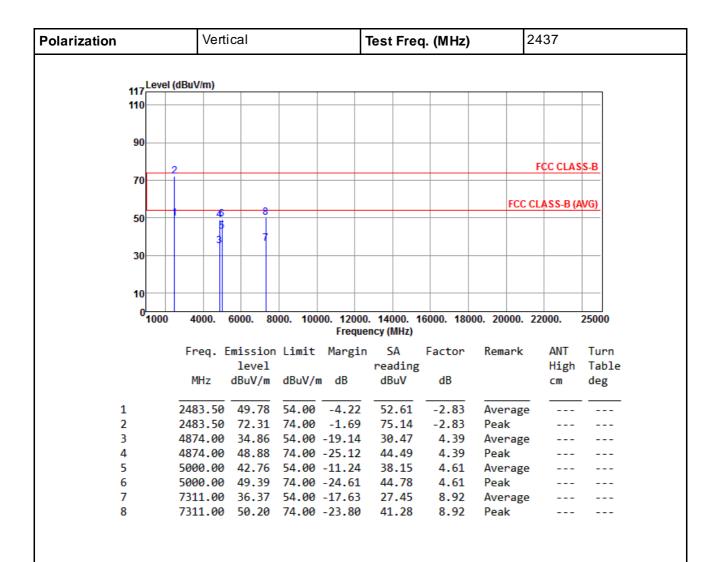
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

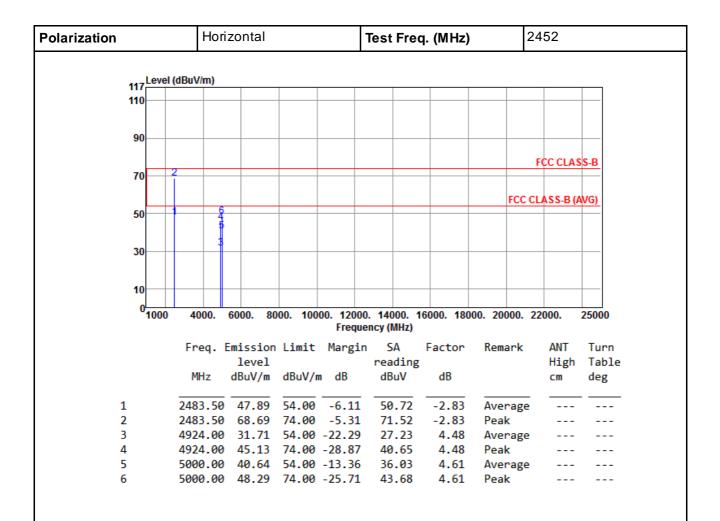
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

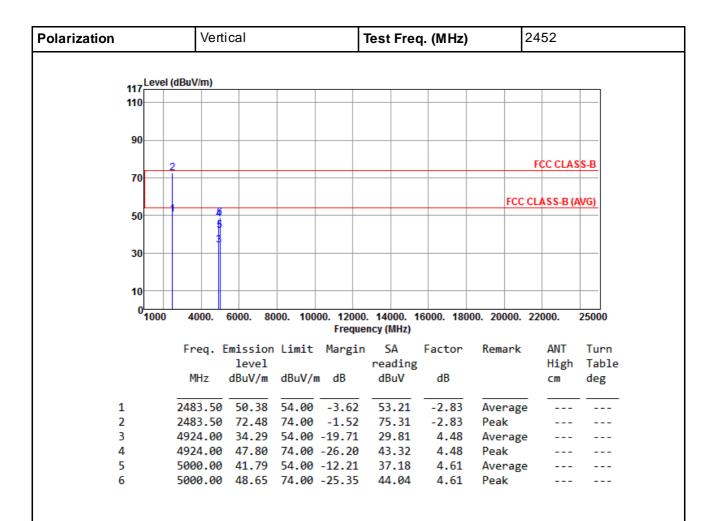
Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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# 3.6 Unwanted Emissions into Non-Restricted Frequency Bands

#### 3.6.1 Limit of Unwanted Emissions into Non-Restricted Frequency Bands

- The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz.
- The peakpower in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz.

#### 3.6.2 Test Procedures

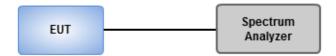
#### Reference Level Measurement

- 1. Set the RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
- 2. Set Sweep time = auto couple, Trace mode = max hold.
- 3. Allow trace to fully stabilize.
- 4. Use the peakmarker function to determine the maximum amplitude level.

#### **Unwanted Emissions Level Measurement**

- 1. Set RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
- 2. Trace Mode = max hold, Sweep = auto couple.
- 3. Allow the trace to stabilize.
- 4. Use peakmarker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

#### 3.6.3 Test Setup



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# 3.6.4 Unwanted Emissions into Non-Restricted Frequency Bands for 11b

	Tra	insmitter Ra	diated Bar	ndedge Emis	sions Resul	t		
Modulation		11b		N <sub>TX</sub>	2			
Non-restricted Band (MHz)	Test Ch. Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	NBE Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Level Type	Po
2390-2400	2412	102.49	2397.02	60.14	42.35	20	PK	Н
2390-2400	2412	105.27	2397.47	63.68	41.59	20	PK	V
2500-2690	2462	102.69	2500.1	41.18	61.51	20	PK	Н
2500-2690	2462	103.87	2500.1	42.01	61.86	20	PK	V
Lo	ow Banded	dge - H			Up Band	dedge - H		
30	maggapeth life for the second	Marine Company of the	CLASS-B (AVG)	50 30 10	Man 2	n sin the annual management of the regular conservation	FCC CLASS-B (	is on to
30	2360. Frequency (MH	2380. 2400.	2422	50		0. 2510. 2520. 25	FCC CLASS-B (	(AVG)
		2380. 2400.		50 30 10	Frequei		Properties and the second seco	is and
02310 2320. 2340.	Frequency (MH:	2380. 2400.		50 30 10	Up Band	dedge - V	Properties and the second seco	2552

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Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical)

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# 3.6.5 Unwanted Emissions into Non-Restricted Frequency Bands for 11g

	Tra	nsmitter Ra	diated Bai	ndedge Emis	sions Resul	t		
Modulation		11g		N <sub>TX</sub>	2			
Non-restricted Band (MHz)	Test Ch. Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	NBE Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Level Type	Pol
2390-2400	2412	2412	102.49	2397.02	60.14	42.35	PK	Н
2390-2400	2412	2412	105.27	2397.47	63.68	41.59	PK	V
2500-2690	2462	2462	102.69	2500.1	41.18	61.51	PK	Н
2500-2690	2462	2462	103.87	2500.1	42.01	61.86	PK	V
Lo	ow Banded	lge - H			Up Band	dedge - H		
70 50 30 10 0 <sub>2340,2320,2340</sub>	7360		CLASS-B (AVG)	50 30 10 024522460. 2470	2480, 2490, 250	0. 2510. 2520 2	FCC CLASS-B	-Managaring proper
50 30 10 0 2310 2320. 2340.	2360. Frequency (MH	2380. 2400.	2422	30	Freque	10. 2510. 2520. 2: ncy (MHz)	FCC CLASS-B	2552
30 10 0 2310 2320. 2340.	Frequency (MH	2380. 2400.		30	Freque	ncy (MHz)		2552 2558

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Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical)

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# 3.6.6 Unwanted Emissions into Non-Restricted Frequency Bands for HT20

	ııa		ulateu bai	ndedge Emis	•			
Modulation		HT20		N <sub>TX</sub>	2			
Non-restricted Band (MHz)	Test Ch. Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	NBE Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Level Type	Po
2390-2400	2412	96.97	2400.0	68.02	28.95	20	PK	Н
2390-2400	2412	102.3	2399.6	71.87	30.43	20	PK	V
2500-2690	2462	97.22	2500.0	43.19	54.03	20	PK	Н
2500-2690	2462	99.98	2500.1	42.06	57.92	20	PK	V
Low Bandedge - H					Up Band	dedge - H		
				10				
02310 2320. 2340.	2360. Frequency (MH		2422	10 2452 2460. 2470.	Frequei	ncy (MHz)	530. 2540.	2552
02310 2320. 2340.		lz)	2422		Frequei		530. 2540.	2552
02310 2320. 2340.	Frequency (MH	dge - V	FCC CLASS-B	024522460. 2470.	Frequei	ncy (MHz)	FCC CLASS-B(	SS-B
	Frequency (MH	2380. 2400.	FCC CLASS B	024522460. 2470.	Up Band	dedge - V	FCC CLA	SS-B

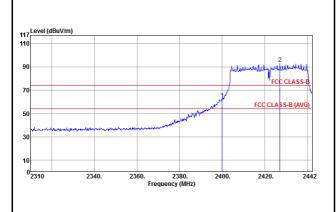
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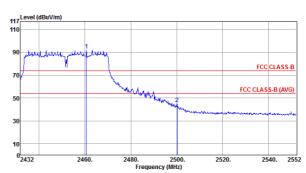
Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical)

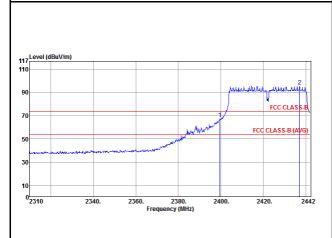
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### 3.6.7 Unwanted Emissions into Non-Restricted Frequency Bands for HT40

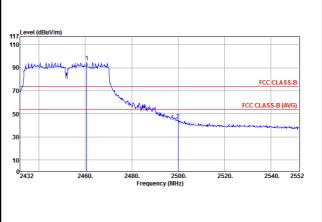
Transmitter Radiated Bandedge Emissions Result									
Modulation	HT40			N <sub>TX</sub>	2				
Non-restricted Band (MHz)	Test Ch. Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	NBE Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Level Type	Pol.	
2390-2400	2422	92.78	2400.0	62.03	30.75	20	PK	Н	
2390-2400	2422	95.54	2399.5	67.38	28.16	20	PK	V	
2500-2690	2452	91.87	2500.16	45.01	46.86	20	PK	Н	
2500-2690	2452	94.87	2500.0	44.45	50.42	20	PK	V	
Low Bandedge - H					Up Band	dedge - H	•		







Low Bandedge - V



Up Bandedge - V

Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical)

--END---

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