



FCC TEST REPORT (WLAN/DTS 15.247)

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MODEL NO.: NFA-BAC-MR-02

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140123E01	Original release	Feb. 21, 2014

1. CERTIFICATION

PRODUCT: 802.11ac/a/b/g/n + BT Wireless Module
BRAND NAME: UG
MODEL NO.: NFA-BAC-MR-02
TEST SAMPLE: ENGINEERING SAMPLE
APPLICANT: UNIVERSAL GLOBAL SCIENTIFIC INDUSTRIAL
CO., LTD.
TESTED: Feb. 07 to 12, 2014
STANDARDS: **FCC Part 15, Subpart C (Section 15.247)**
ANSI C63.10-2009

The above equipment (Model: NFA-BAC-MR-02) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Midoli Peng , **DATE:** Feb. 21, 2014
(Midoli Peng, Specialist)

APPROVED BY : May Chen , **DATE:** Feb. 21, 2014
(May Chen, Manager)



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2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 2.4GHz(WLAN), 2400~2483.5MHz Band

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -7.30dB at 24.000MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2483.00MHz & 2390.00MHz
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-pex(MHF) not a standard connector.

For 2.4GHz(BT-LE(GFSK)), 2402~2480MHz Band

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -13.75dB at 24.000MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -4.8dB at 156.23MHz
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-pex(MHF) not a standard connector.



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For 5GHz, 5725~5850MHz Band

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -13.89dB at 24.00MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -4.9dB at 156.61MHz
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-pex(MHF) not a standard connector.

NOTE: The EUT was operating in 2.400 ~ 2.4835GHz, 5.15~5.35GHz, 5.47~5.6GHz & 5.65~5.725GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2.400 ~ 2.4835GHz and 5.725~5.850GHz. For the 5.15~5.35GHz, 5.47~5.6GHz & 5.65~5.725GHz RF parameters was recorded in another test report.



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2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Value
Conducted emissions	2.98 dB
Radiated emissions (30MHz-1GHz)	5.43 dB
Radiated emissions (1GHz -6GHz)	3.72 dB
Radiated emissions (6GHz -18GHz)	4.00 dB
Radiated emissions (18GHz -40GHz)	4.11 dB



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3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT(WLAN/DTS)

PRODUCT	802.11ac/a/b/g/n + BT Wireless Module
MODEL NO.	NFA-BAC-MR-02
POWER SUPPLY	DC 3.3V from host equipment
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM BT-LE (GFSK) for DTS 256QAM for OFDM in 11ac mode only
MODULATION TECHNOLOGY	DSSS,OFDM, DTS
TRANSFER RATE	802.11b: up to 11Mbps 802.11a / g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps BT-LE (GFSK): 1Mbps
OPERATING FREQUENCY	For 15.407 5GHz: 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.50 ~ 5.58GHz & 5.66GHz ~ 5.70GHz
	For 15.247 2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.745 ~ 5.825GHz BT-LE(GFSK): 2.402 ~ 2.480GHz
NUMBER OF CHANNEL	For 15.407 16 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 7 for 802.11n (HT40), 802.11ac (VHT40) 3 for 802.11ac (VHT80)
	For 15.247 (2.4GHz) 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40) For 15.247 (5GHz) 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)



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MAXIMUM OUTPUT POWER	For 15.407 802.11a: 40.832mW 802.11ac (VHT20): 74.158mW 802.11ac (VHT40): 56.017mW 802.11ac (VHT80): 14.724mW	
	For 15.247 (2.4GHz) 802.11b: 98.401mW 802.11g: 470.977mW 802.11n (HT20): 795.974mW 802.11n (HT40): 531.246mW BT-LE(GFSK): 17.539mW	
	For 15.247 (5GHz) 802.11a: 146.555mW 802.11ac (VHT20): 299.047mW 802.11ac (VHT40): 261.060mW 802.11ac (VHT80): 148.175mW	
	ANTENNA TYPE	Please see NOTE
	DATA CABLE	NA
	I/O PORTS	Refer to user's manual
	ASSOCIATED DEVICES	NA

Note:

1. There are Bluetooth technology and WLAN technology used for the EUT.
2. WLAN & BT technology can not transmit at same time.
3. The antennas provided to the EUT, please refer to the following table:

Transmitter Circuit	Brand	Model	Antenna Gain(dBi) <Including cable loss>	Frequency range (GHz to GHz)	Antenna Type	Connector Type	Cable Loss (dB)	Cable Length (mm)
Chain (0) Ant. 1 (WLAN Ant)	High-Tek Electronics Co.,Ltd	DC33001JB20	1.5	2.4~2.4835	PIFA	i-pex(MHF)	0.65	260
			0.68	5.15~5.35	PIFA	i-pex(MHF)	1.02	260
			2.77	5.47~5.75			1.07	
Chain (1) Ant. 2 (WLAN+BT Ant)	High-Tek Electronics Co.,Ltd	DC33001JB30	2.72	5.75~5.85	PIFA	i-pex(MHF)	1.09	390
			-1.55	2.4~2.4835			0.98	
			1.57	5.15~5.35	PIFA	i-pex(MHF)	1.53	390
2.77	5.47~5.7	1.6						
			1.70	5.75~5.85			1.64	

Note: For 802. 11a/b/g mode: Max. antenna gain was chosen for final test.

4. The EUT incorporates a MIMO function without beamforming.

MODULATION MODE	Tx/Rx FUNCTION
802.11a	1Tx/1Rx (diversity)
802.11b	1Tx/1Rx (diversity)
802.11g	1Tx/1Rx (diversity)
802.11n (HT20)	1Tx/1Rx (diversity) or 2Tx/2Rx
802.11n (HT40)	1Tx/1Rx (diversity) or 2Tx/2Rx
802.11ac (VHT20)	1Tx/1Rx (diversity) or 2Tx/2Rx
802.11ac (VHT40)	1Tx/1Rx (diversity) or 2Tx/2Rx
802.11ac (VHT80)	1Tx/1Rx (diversity) or 2Tx/2Rx

Note: The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

5. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 15.
6. When the EUT operating in 802.11ac, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 9.
7. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Operated in 2400 ~ 2483.5MHz band:

11 channels are provided for 802.11b, 802.11g, 802.11n (HT20):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

7 channels are provided for 802.11n (HT40):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

40 channels are provided for Bluetooth LE mode:

CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480



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Operated in 5725 ~ 5850MHz band:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

CHANNEL	FREQUENCY
151	5755 MHz
159	5795 MHz

1 channel is provided for 802.11ac (VHT80):

CHANNEL	FREQUENCY
155	5775 MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	PLC	RE < 1G	RE ³ 1G	APCM	OB	
-	√	√	√	√	√	-

Where **PLC**: Power Line Conducted Emission **RE < 1G**: Radiated Emission below 1GHz
RE ³ 1G: Radiated Emission above 1GHz **APCM**: Antenna Port Conducted Measurement
OB: Conducted Out-Band Emission Measurement

NOTE: 1. For 2.4GHz: The EUT's antenna (PIFA) had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
2. For 5GHz: The EUT's antenna (PIFA) had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane** (for below 1GHz) and **Y-plane** (for above 1GHz).

POWER LINE CONDUCTED EMISSION TEST:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
For 2.4 GHz 802.11n (HT20)	1 to 11	6	OFDM	BPSK	13
BT-LE	0 to 39	39	DTS	GFSK	1
For 5 GHz 802.11ac (VHT20)	149 to 165	149	OFDM	BPSK	13

RADIATED EMISSION TEST (BELOW 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
For 2.4 GHz 802.11n (HT20)	1 to 11	6	OFDM	BPSK	13
BT-LE	0 to 39	39	DTS	GFSK	1
For 5 GHz 802.11ac (VHT20)	149 to 165	149	OFDM	BPSK	13

RADIATED EMISSION TEST (ABOVE 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
For 2.4 GHz 802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	13
For 2.4 GHz 802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	27
BT-LE	0 to 39	0, 19, 39	DTS	GFSK	1
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
For 5 GHz 802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	13
For 5 GHz 802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	27
For 5 GHz 802.11ac (VHT80)	155	155	OFDM	BPSK	58.5

ANTENNA PORT CONDUCTED MEASUREMENT:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
For 2.4 GHz 802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	13
For 2.4 GHz 802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	27
BT-LE	0 to 39	0, 19, 39	DTS	GFSK	1
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
For 5 GHz 802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	13
For 5 GHz 802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	27
For 5 GHz 802.11ac (VHT80)	155	155	OFDM	BPSK	58.5



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CONDUCTED OUT-BAND EMISSION MEASUREMENT:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
For 2.4 GHz 802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	13
For 2.4 GHz 802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	27
BT-LE	0 to 39	0, 19, 39	DTS	GFSK	1
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
For 5 GHz 802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	13
For 5 GHz 802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	27
For 5 GHz 802.11ac (VHT80)	155	155	OFDM	BPSK	58.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
PLC	16deg. 69C,%RH	120Vac, 60Hz	Jason Huang
RE<1G	21deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
RE ³ 1G	22deg. C, 66%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Chilin Lee

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C. (15.247)

558074 D01 DTS Meas Guidance v03r01

662911 D01 Multiple Transmitter Output v02

ANSI C63.10-2009

All test items have been performed and recorded as per the above standards.

Note: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

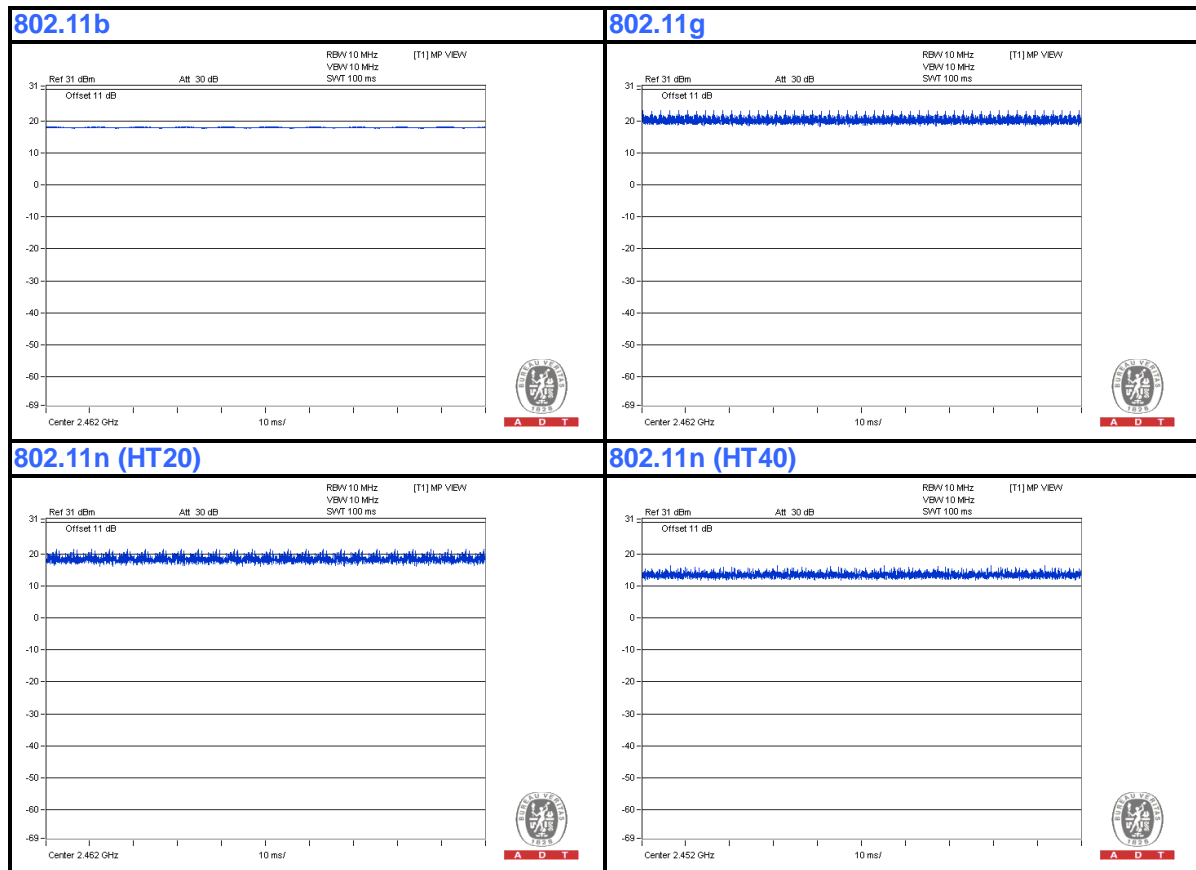


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3.4 DUTY CYCLE OF TEST SIGNAL

Duty cycle of test signal is 100 %, duty factor is not required.

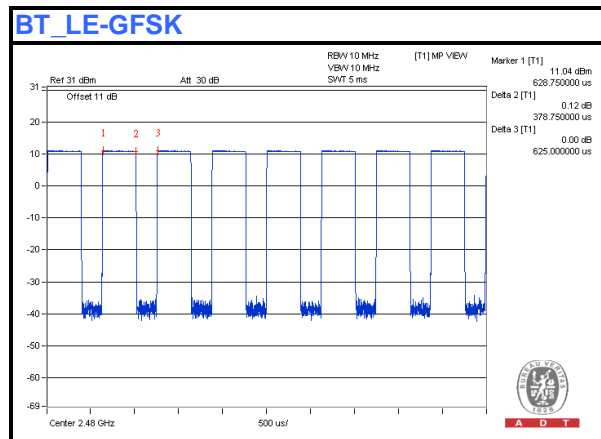
For 2.4GHz



Duty cycle of test signal is < 98%, duty factor shall be considered.

For BT_LE-GFSK:

Duty cycle = 0.379 ms/0.625 ms = 0.606, Duty factor = $10 * \log(1/0.606) = 2.2$

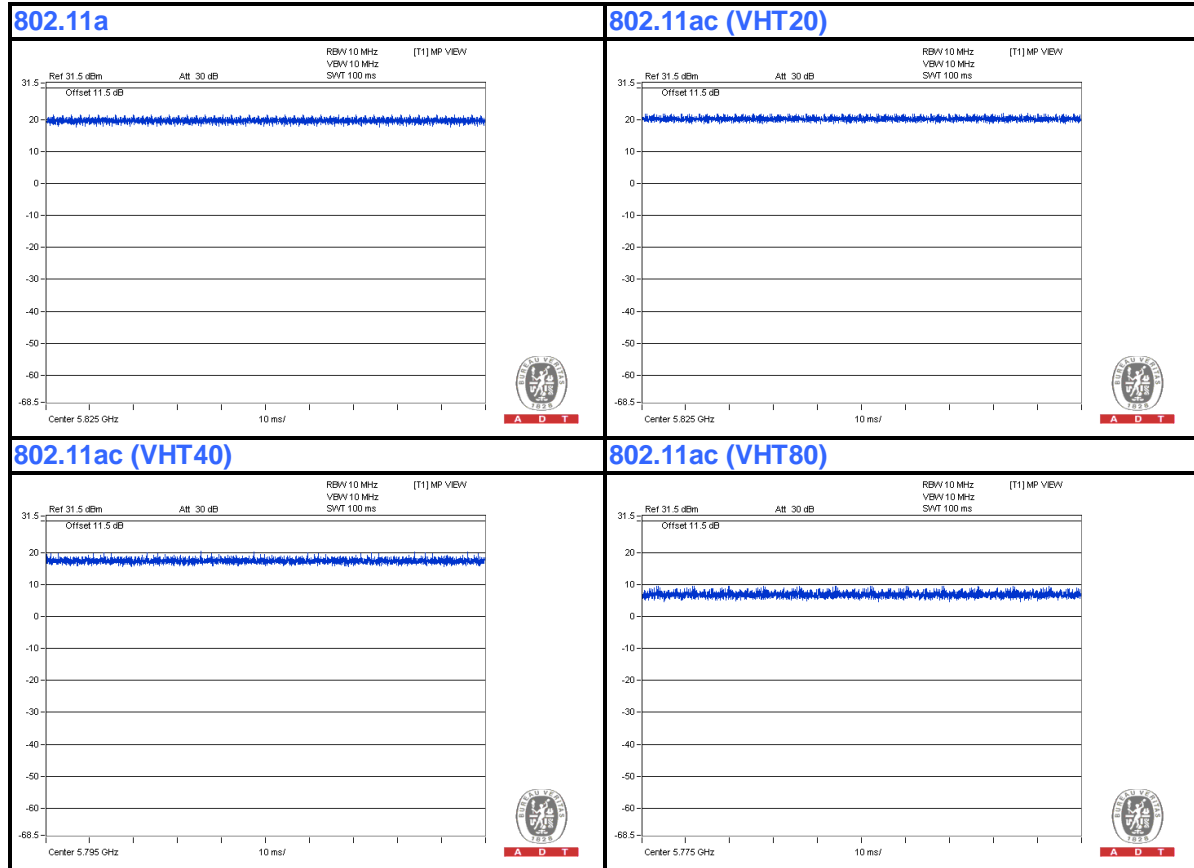




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Duty cycle of test signal is 100 %, duty factor is not required.

For 5GHz





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3.5 DESCRIPTION OF SUPPORT UNITS

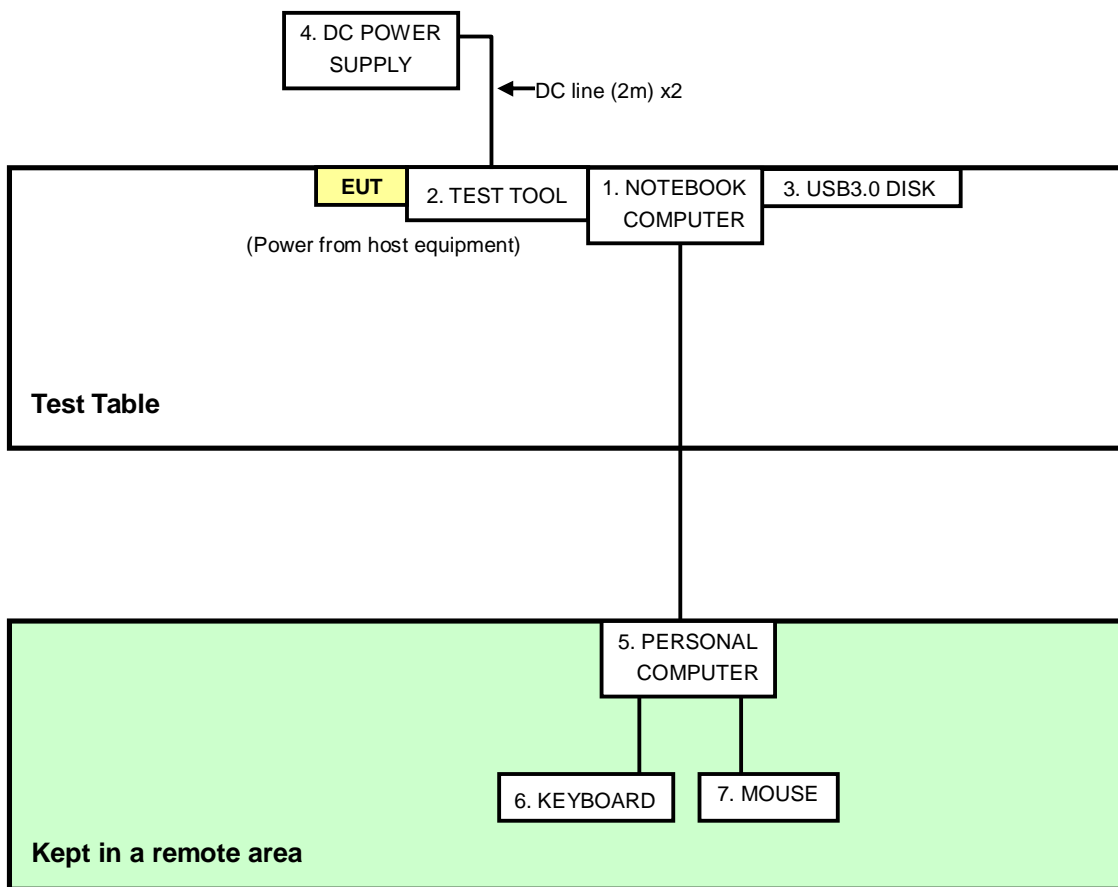
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	Lenovo	L3Z0244	NA	NA
2	TEST TOOL	UGSI	NA	NA	NA
3	USB 3.0 DISK	UGSI	NA	NA	NA
4	DC POWER SUPPLY	Topward	6603D	795558	NA
5	PERSONAL COMPUTER	Lenovo	NA	NA	NA
6	KEYBOARD	DELL	SK-8115	MY-0DJ325-71619-99 B-0479	FCC DoC
7	MOUSE	DELL	MOC5UO	I14066PS	FCC DoC

No.	Signal cable description
1	NA
2	NA
3	NA
4	DC cable(2m)
5	UTP cable(10m)
6	USB cable(1.7m)
7	USB cable(1.5m)

Note: The power cords of the above support units were unshielded (1.8m).

3.6 CONFIGURATION OF SYSTEM UNDER TEST





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4. TEST TYPES AND RESULTS (FOR 2.4GHz, 2.400 ~ 2.4835GHz Band)

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 05, 2013	Sep. 04, 2014
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 06, 2013	June 05, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-03	Sep. 24, 2013	Sep. 23, 2014
Software ADT	BV ADT_Cond_V7.3.7. 3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
- 3 The VCCI Con C Registration No. is C-3611.
- 4 Tested Date: Feb. 12, 2014

4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN.
- b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- d. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

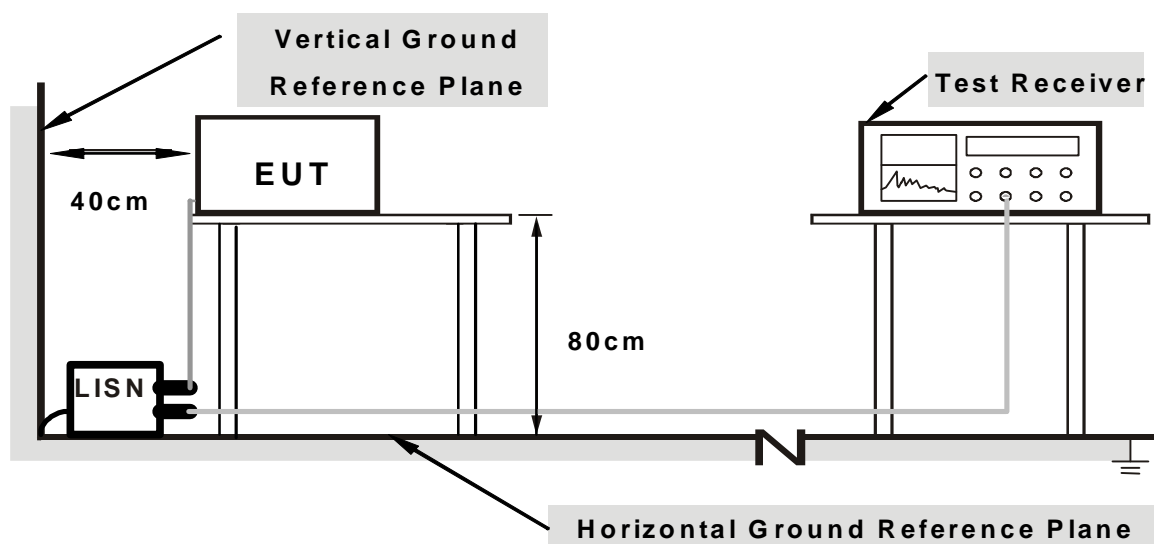
NOTE:

1. The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



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4.1.6 EUT OPERATING CONDITIONS

1. Connect the EUT with the support unit 1 (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program “DutApiMimoBtFmBrdigeEth-shortcut” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

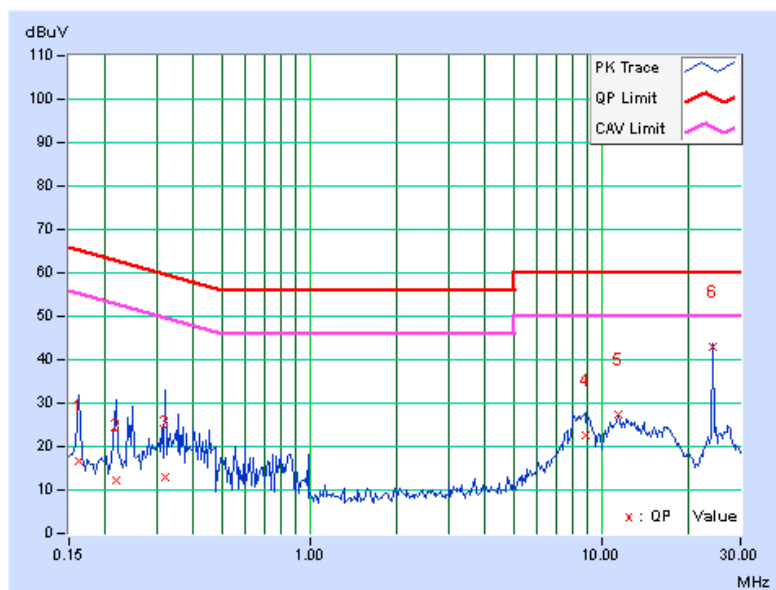
4.1.7 TEST RESULTS (WLAN)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
--------------	----------	--------------------------	--------------------------------

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.08	16.60	-4.49	16.68	-4.41	65.38	55.38	-48.69	-59.78
2	0.21641	0.10	12.00	-3.72	12.10	-3.62	62.96	52.96	-50.85	-56.57
3	0.32188	0.12	12.81	-4.97	12.93	-4.85	59.66	49.66	-46.72	-54.50
4	8.78906	0.43	22.25	17.57	22.68	18.00	60.00	50.00	-37.32	-32.00
5	11.44531	0.51	26.87	22.34	27.38	22.85	60.00	50.00	-32.62	-27.15
6	24.00000	0.83	42.03	41.87	42.86	42.70	60.00	50.00	-17.14	-7.30

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

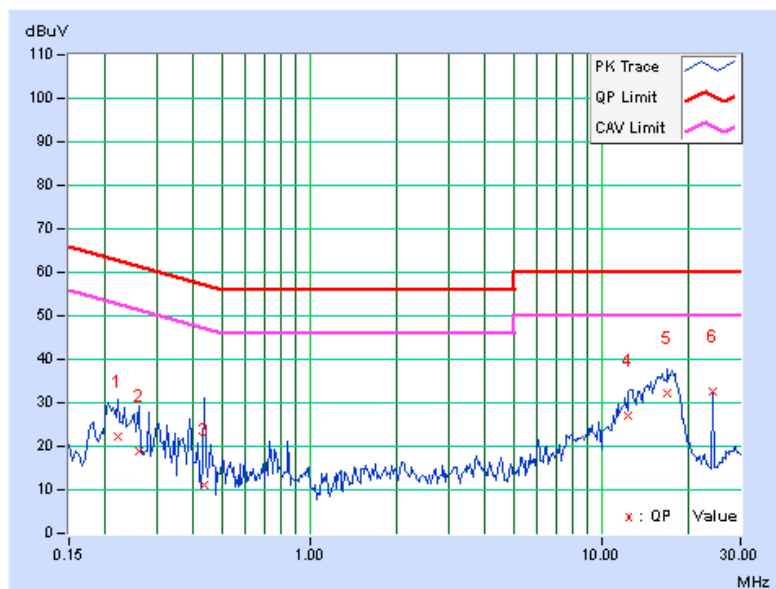


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
--------------	-------------	--------------------------	--------------------------------

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.22031	0.10	21.96	15.90	22.06	16.00	62.81	52.81	-40.74	-36.80
2	0.25938	0.11	18.86	10.80	18.97	10.91	61.45	51.45	-42.48	-40.54
3	0.43516	0.14	10.81	-2.74	10.95	-2.60	57.15	47.15	-46.20	-49.75
4	12.42188	0.54	26.56	21.93	27.10	22.47	60.00	50.00	-32.90	-27.53
5	16.75000	0.64	31.70	26.79	32.34	27.43	60.00	50.00	-27.66	-22.57
6	24.00000	0.82	31.65	30.71	32.47	31.53	60.00	50.00	-27.53	-18.47

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



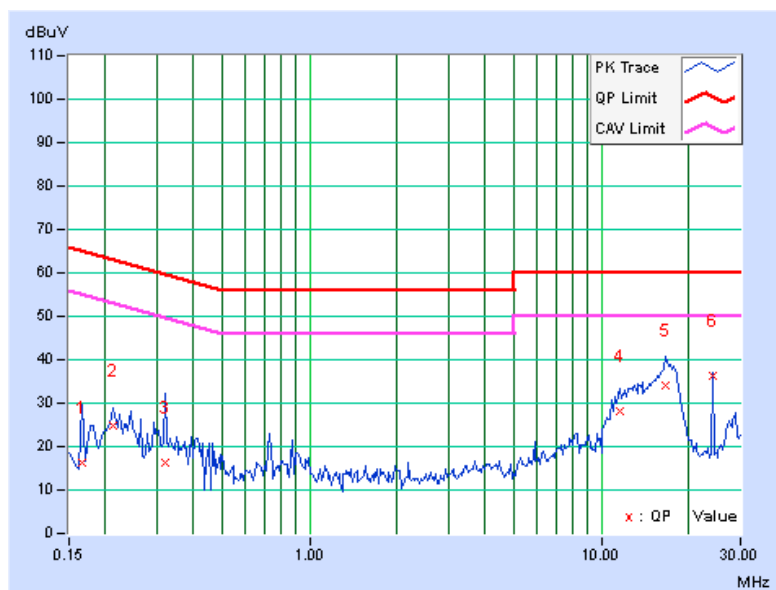
4.1.8 TEST RESULTS (BT<LE>)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
--------------	----------	--------------------------	--------------------------------

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	0.09	16.14	8.25	16.23	8.34	65.18	55.18	-48.95	-46.84
2	0.21250	0.10	24.53	17.90	24.63	18.00	63.11	53.11	-38.47	-35.10
3	0.32188	0.12	16.08	5.68	16.20	5.80	59.66	49.66	-43.45	-43.85
4	11.60547	0.52	27.74	23.19	28.26	23.71	60.00	50.00	-31.74	-26.29
5	16.61719	0.65	33.35	28.71	34.00	29.36	60.00	50.00	-26.00	-20.64
6	24.00000	0.83	35.46	35.42	36.29	36.25	60.00	50.00	-23.71	-13.75

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

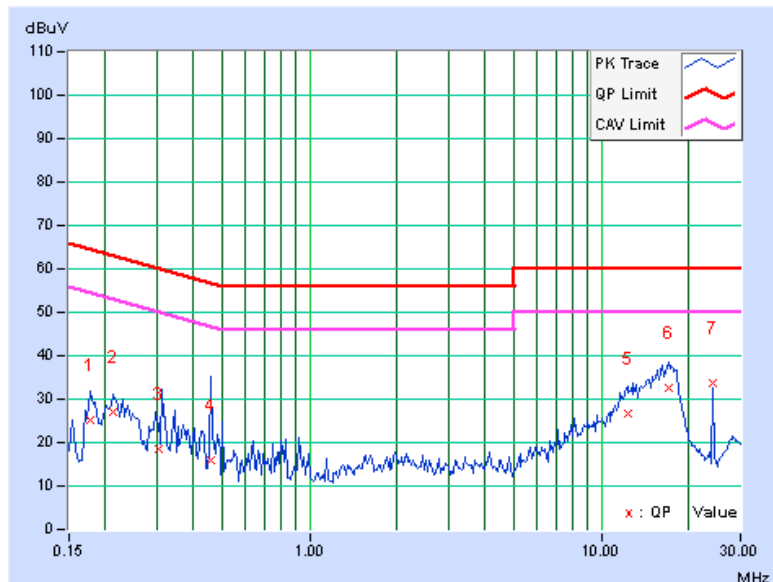


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
--------------	-------------	--------------------------	--------------------------------

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17734	0.10	25.05	20.56	25.15	20.66	64.61	54.61	-39.46	-33.95
2	0.21250	0.10	26.80	21.24	26.90	21.34	63.11	53.11	-36.20	-31.76
3	0.30431	0.12	18.53	9.13	18.65	9.25	60.12	50.12	-41.47	-40.87
4	0.45859	0.14	15.72	-3.53	15.86	-3.39	56.72	46.72	-40.86	-50.11
5	12.28125	0.54	26.18	21.37	26.72	21.91	60.00	50.00	-33.28	-28.09
6	16.94922	0.65	31.83	27.16	32.48	27.81	60.00	50.00	-27.52	-22.19
7	24.00000	0.82	32.75	30.71	33.57	31.53	60.00	50.00	-26.43	-18.47

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value





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4.2 RADIATED EMISSION AND BANDEGE MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION AND BANDEGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 15, 2014	Jan. 14, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
RF Cable	NA	CHHCAB_001	Oct. 06, 2013	Oct. 05, 2014
Spectrum Analyzer R&S	FSV40	100964	July 15, 2013	July 14, 2014
Horn_Antenna AISi	AIH.8018	0000220091110	Dec. 06, 2013	Dec. 05, 2014
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 29, 2013	Oct. 28, 2014
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 12, 2013	Dec. 11, 2014
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKka-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5. The CANADA Site Registration No. is IC 7450H-3.
6. Tested Date: Feb. 08, 2014

4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

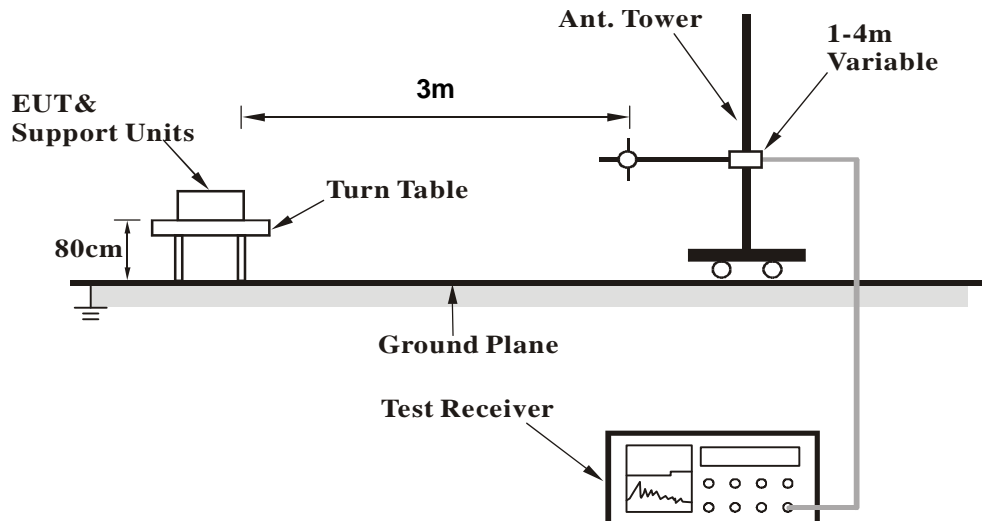
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

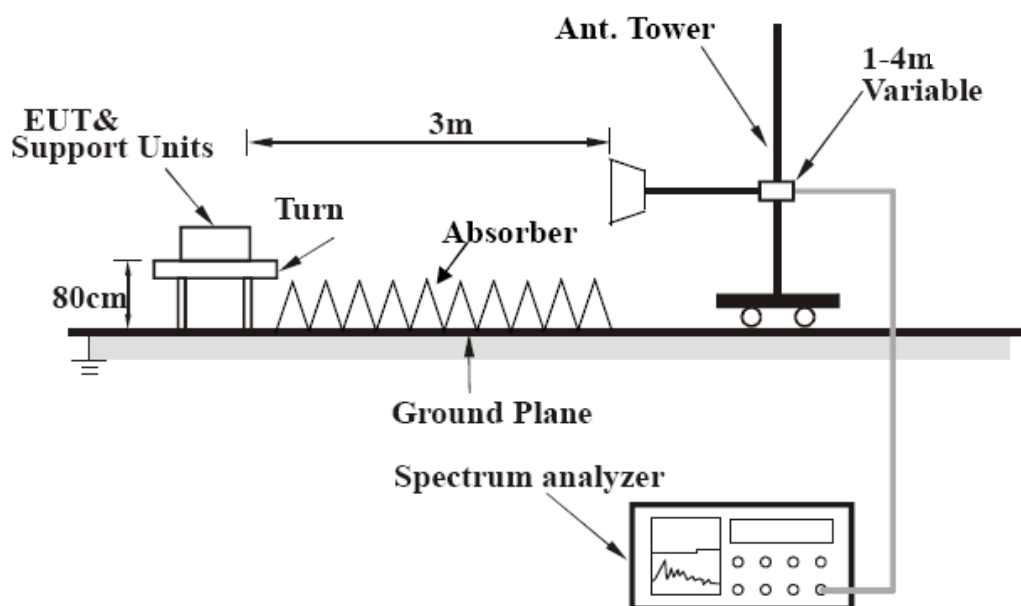
No deviation

4.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.7 TEST RESULTS (WLAN)

BELOW 1GHz WORST-CASE DATA

802.11n (HT20)

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	144.02	37.8 QP	43.5	-5.7	2.00 H	360	50.32	-12.54
2	157.26	38.3 QP	43.5	-5.2	1.50 H	178	51.07	-12.77
3	160.74	36.3 QP	43.5	-7.2	2.00 H	25	48.98	-12.71
4	240.01	36.5 QP	46.0	-9.5	1.25 H	205	50.43	-13.89
5	298.74	40.4 QP	46.0	-5.6	1.00 H	190	52.10	-11.71
6	360.04	41.0 QP	46.0	-5.0	1.00 H	344	50.95	-9.97
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	36.11	34.1 QP	40.0	-5.9	1.00 V	77	47.31	-13.22
2	59.49	31.1 QP	40.0	-9.0	1.00 V	114	44.53	-13.48
3	174.97	36.4 QP	43.5	-7.1	1.00 V	323	50.35	-13.98
4	199.22	36.8 QP	43.5	-6.7	1.50 V	260	52.68	-15.84
5	299.71	37.3 QP	46.0	-8.7	1.00 V	146	49.02	-11.69
6	335.99	41.4 QP	46.0	-4.6	1.00 V	2	52.00	-10.64

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



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ABOVE 1GHz WORST-CASE DATA

802.11b

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	47.5 PK	74.0	-26.5	1.41 H	243	13.97	33.53
2	2390.00	36.3 AV	54.0	-17.7	1.41 H	243	2.77	33.53
3	*2412.00	99.1 PK			1.41 H	243	65.51	33.59
4	*2412.00	96.0 AV			1.41 H	243	62.41	33.59
5	4824.00	53.1 PK	74.0	-20.9	1.54 H	175	9.92	43.18
6	4824.00	46.7 AV	54.0	-7.3	1.54 H	175	3.52	43.18

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	53.9 PK	74.0	-20.1	1.11 V	323	20.37	33.53
2	2390.00	35.1 AV	54.0	-18.9	1.11 V	323	1.57	33.53
3	*2412.00	90.9 PK			1.18 V	214	57.31	33.59
4	*2412.00	86.5 AV			1.18 V	214	52.91	33.59
5	4824.00	51.7 PK	74.0	-22.3	1.04 V	262	8.52	43.18
6	4824.00	41.1 AV	54.0	-12.9	1.04 V	262	-2.08	43.18

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	98.9 PK			1.40 H	254	65.23	33.67
2	*2437.00	96.1 AV			1.40 H	254	62.43	33.67
3	4874.00	54.1 PK	74.0	-19.9	1.23 H	175	10.86	43.24
4	4874.00	47.5 AV	54.0	-6.5	1.23 H	175	4.26	43.24
5	7311.00	58.2 PK	74.0	-15.8	1.00 H	188	10.13	48.07
6	7311.00	44.6 AV	54.0	-9.4	1.00 H	188	-3.47	48.07

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	90.8 PK			1.16 V	214	57.13	33.67
2	*2437.00	86.6 AV			1.16 V	214	52.93	33.67
3	4874.00	51.9 PK	74.0	-22.1	1.00 V	260	8.66	43.24
4	4874.00	41.2 AV	54.0	-12.8	1.00 V	260	-2.04	43.24
5	7311.00	58.1 PK	74.0	-15.9	1.00 V	322	10.03	48.07
6	7311.00	44.6 AV	54.0	-9.4	1.00 V	322	-3.47	48.07

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



A D T

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	99.0 PK			1.37 H	259	65.26	33.74
2	*2462.00	95.9 AV			1.37 H	259	62.16	33.74
3	2483.50	60.4 PK	74.0	-13.6	1.42 H	274	26.59	33.81
4	2483.50	35.4 AV	54.0	-18.6	1.42 H	274	1.59	33.81
5	4924.00	54.3 PK	74.0	-19.7	1.22 H	178	11.03	43.27
6	4924.00	47.6 AV	54.0	-6.4	1.22 H	178	4.33	43.27
7	7386.00	57.8 PK	74.0	-16.2	1.05 H	186	9.40	48.40
8	7386.00	44.4 AV	54.0	-9.6	1.05 H	186	-4.00	48.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	91.2 PK			1.16 V	321	57.46	33.74
2	*2462.00	86.8 AV			1.16 V	321	53.06	33.74
3	2483.50	53.6 PK	74.0	-20.4	1.16 V	321	19.79	33.81
4	2483.50	34.9 AV	54.0	-19.1	1.16 V	321	1.09	33.81
5	4924.00	52.2 PK	74.0	-21.8	1.05 V	254	8.93	43.27
6	4924.00	41.7 AV	54.0	-12.3	1.05 V	254	-1.57	43.27
7	7386.00	57.9 PK	74.0	-16.1	1.02 V	333	9.50	48.40
8	7386.00	44.4 AV	54.0	-9.6	1.02 V	333	-4.00	48.40

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



A D T

802.11g

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	57.3 PK	74.0	-16.7	1.39 H	290	23.77	33.53
2	2390.00	42.3 AV	54.0	-11.7	1.39 H	290	8.77	33.53
3	*2412.00	101.7 PK			1.39 H	290	68.11	33.59
4	*2412.00	90.8 AV			1.39 H	290	57.21	33.59
5	4824.00	46.8 PK	74.0	-27.2	1.00 H	220	3.62	43.18
6	4824.00	36.3 AV	54.0	-17.7	1.00 H	220	-6.88	43.18

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	53.1 PK	74.0	-20.9	1.16 V	302	19.57	33.53
2	2390.00	34.6 AV	54.0	-19.4	1.16 V	302	1.07	33.53
3	*2412.00	92.3 PK			1.16 V	302	58.71	33.59
4	*2412.00	81.8 AV			1.16 V	302	48.21	33.59
5	4824.00	48.5 PK	74.0	-25.5	1.04 V	104	5.32	43.18
6	4824.00	36.6 AV	54.0	-17.4	1.04 V	104	-6.58	43.18

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * " : Fundamental frequency.



A D T

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	101.5 PK			1.43 H	281	67.83	33.67
2	*2437.00	90.5 AV			1.43 H	281	56.83	33.67
3	4874.00	48.2 PK	74.0	-25.8	1.00 H	338	4.96	43.24
4	4874.00	36.9 AV	54.0	-17.1	1.00 H	338	-6.34	43.24
5	7311.00	52.4 PK	74.0	-21.6	1.03 H	342	4.33	48.07
6	7311.00	42.2 AV	54.0	-11.8	1.03 H	342	-5.87	48.07

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	92.5 PK			1.13 V	311	58.83	33.67
2	*2437.00	82.2 AV			1.13 V	311	48.53	33.67
3	4874.00	48.1 PK	74.0	-25.9	1.29 V	132	4.86	43.24
4	4874.00	37.7 AV	54.0	-16.3	1.29 V	132	-5.54	43.24
5	7311.00	53.7 PK	74.0	-20.3	1.08 V	201	5.63	48.07
6	7311.00	42.6 AV	54.0	-11.4	1.08 V	201	-5.47	48.07

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



A D T

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	101.1 PK			1.37 H	293	67.36	33.74
2	*2462.00	90.2 AV			1.37 H	293	56.46	33.74
3	2483.50	62.5 PK	74.0	-11.5	1.37 H	293	28.69	33.81
4	2483.50	45.0 AV	54.0	-9.0	1.37 H	293	11.19	33.81
5	4924.00	48.7 PK	74.0	-25.3	1.00 H	332	5.43	43.27
6	4924.00	37.0 AV	54.0	-17.0	1.00 H	332	-6.27	43.27
7	7386.00	52.7 PK	74.0	-21.3	1.00 H	342	4.30	48.40
8	7386.00	42.7 AV	54.0	-11.3	1.00 H	342	-5.70	48.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	92.1 PK			1.13 V	311	58.36	33.74
2	*2462.00	81.5 AV			1.13 V	311	47.76	33.74
3	2483.50	53.8 PK	74.0	-20.2	1.13 V	311	19.99	33.81
4	2483.50	35.3 AV	54.0	-18.7	1.13 V	311	1.49	33.81
5	4924.00	47.7 PK	74.0	-26.3	1.29 V	139	4.43	43.27
6	4924.00	37.3 AV	54.0	-16.7	1.29 V	139	-5.97	43.27
7	7386.00	53.1 PK	74.0	-20.9	1.13 V	228	4.70	48.40
8	7386.00	42.2 AV	54.0	-11.8	1.13 V	228	-6.20	48.40

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



A D T

802.11n (HT20)

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	69.2 PK	74.0	-4.8	1.08 H	141	35.67	33.53
2	2390.00	53.0 AV	54.0	-1.0	1.08 H	141	19.47	33.53
3	*2412.00	104.5 PK			1.08 H	141	70.91	33.59
4	*2412.00	93.3 AV			1.08 H	141	59.71	33.59
5	4824.00	47.3 PK	74.0	-26.7	1.00 H	216	4.12	43.18
6	4824.00	36.8 AV	54.0	-17.2	1.00 H	216	-6.38	43.18

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.3 PK	74.0	-10.7	1.04 V	141	29.77	33.53
2	2390.00	45.9 AV	54.0	-8.1	1.04 V	141	12.37	33.53
3	*2412.00	96.0 PK			1.04 V	141	62.41	33.59
4	*2412.00	84.8 AV			1.04 V	141	51.21	33.59
5	4824.00	48.7 PK	74.0	-25.3	1.06 V	115	5.52	43.18
6	4824.00	36.8 AV	54.0	-17.2	1.06 V	115	-6.38	43.18

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * " : Fundamental frequency.



A D T

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	105.4 PK			1.10 H	221	71.73	33.67
2	*2437.00	93.2 AV			1.10 H	221	59.53	33.67
3	4874.00	48.3 PK	74.0	-25.7	1.03 H	353	5.06	43.24
4	4874.00	36.9 AV	54.0	-17.1	1.03 H	353	-6.34	43.24
5	7311.00	52.8 PK	74.0	-21.2	1.03 H	333	4.73	48.07
6	7311.00	42.5 AV	54.0	-11.5	1.03 H	333	-5.57	48.07

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	96.4 PK			1.00 V	138	62.73	33.67
2	*2437.00	85.2 AV			1.00 V	138	51.53	33.67
3	4874.00	47.8 PK	74.0	-26.2	1.29 V	153	4.56	43.24
4	4874.00	37.4 AV	54.0	-16.6	1.29 V	153	-5.84	43.24
5	7311.00	53.6 PK	74.0	-20.4	1.10 V	199	5.53	48.07
6	7311.00	42.4 AV	54.0	-11.6	1.10 V	199	-5.67	48.07

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	104.7 PK			1.08 H	223	70.96	33.74
2	*2462.00	93.5 AV			1.08 H	223	59.76	33.74
3	2483.50	71.5 PK	74.0	-2.5	1.08 H	223	37.69	33.81
4	2483.50	53.0 AV	54.0	-1.0	1.08 H	223	19.19	33.81
5	4924.00	48.3 PK	74.0	-25.7	1.05 H	351	5.03	43.27
6	4924.00	36.9 AV	54.0	-17.1	1.05 H	351	-6.37	43.27
7	7386.00	52.8 PK	74.0	-21.2	1.00 H	335	4.40	48.40
8	7386.00	42.3 AV	54.0	-11.7	1.00 H	335	-6.10	48.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	96.1 PK			1.00 V	144	62.36	33.74
2	*2462.00	85.0 AV			1.00 V	144	51.26	33.74
3	2483.50	63.0 PK	74.0	-11.0	1.00 V	144	29.19	33.81
4	2483.50	45.5 AV	54.0	-8.5	1.00 V	144	11.69	33.81
5	4924.00	47.5 PK	74.0	-26.5	1.31 V	152	4.23	43.27
6	4924.00	37.1 AV	54.0	-16.9	1.31 V	152	-6.17	43.27
7	7386.00	53.3 PK	74.0	-20.7	1.11 V	201	4.90	48.40
8	7386.00	42.5 AV	54.0	-11.5	1.11 V	201	-5.90	48.40

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



A D T

802.11n (HT40)

CHANNEL	TX Channel 3	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.2 PK	74.0	-6.8	1.12 H	223	33.67	33.53
2	2390.00	52.0 AV	54.0	-2.0	1.12 H	223	18.47	33.53
3	*2422.00	100.6 PK			1.12 H	223	66.98	33.62
4	*2422.00	88.4 AV			1.12 H	223	54.78	33.62
5	4844.00	48.3 PK	74.0	-25.7	1.05 H	351	5.10	43.20
6	4844.00	37.1 AV	54.0	-16.9	1.05 H	351	-6.10	43.20
7	7266.00	52.3 PK	74.0	-21.7	1.02 H	342	4.39	47.91
8	7266.00	42.0 AV	54.0	-12.0	1.02 H	342	-5.91	47.91

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.3 PK	74.0	-15.7	1.70 V	214	24.77	33.53
2	2390.00	42.3 AV	54.0	-11.7	1.70 V	214	8.77	33.53
3	*2422.00	89.4 PK			1.70 V	214	55.78	33.62
4	*2422.00	77.6 AV			1.70 V	214	43.98	33.62
5	4844.00	48.0 PK	74.0	-26.0	1.32 V	138	4.80	43.20
6	4844.00	37.7 AV	54.0	-16.3	1.32 V	138	-5.50	43.20
7	7266.00	52.9 PK	74.0	-21.1	1.05 V	216	4.99	47.91
8	7266.00	41.8 AV	54.0	-12.2	1.05 V	216	-6.11	47.91

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	101.0 PK			1.37 H	274	67.33	33.67
2	*2437.00	90.2 AV			1.37 H	274	56.53	33.67
3	4874.00	48.2 PK	74.0	-25.8	1.06 H	343	4.96	43.24
4	4874.00	36.7 AV	54.0	-17.3	1.06 H	343	-6.54	43.24
5	7311.00	52.7 PK	74.0	-21.3	1.00 H	331	4.63	48.07
6	7311.00	42.6 AV	54.0	-11.4	1.00 H	331	-5.47	48.07

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	91.5 PK			1.70 V	214	57.83	33.67
2	*2437.00	79.6 AV			1.70 V	214	45.93	33.67
3	4874.00	47.9 PK	74.0	-26.1	1.36 V	127	4.66	43.24
4	4874.00	37.4 AV	54.0	-16.6	1.36 V	127	-5.84	43.24
5	7311.00	53.4 PK	74.0	-20.6	1.08 V	219	5.33	48.07
6	7311.00	42.2 AV	54.0	-11.8	1.08 V	219	-5.87	48.07

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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CHANNEL	TX Channel 9	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	99.0 PK			1.37 H	271	65.29	33.71
2	*2452.00	88.7 AV			1.37 H	271	54.99	33.71
3	2483.50	67.4 PK	74.0	-6.6	1.37 H	271	33.59	33.81
4	2483.50	52.3 AV	54.0	-1.7	1.37 H	271	18.49	33.81
5	4904.00	47.9 PK	74.0	-26.1	1.00 H	346	4.63	43.27
6	4904.00	36.4 AV	54.0	-17.6	1.00 H	346	-6.87	43.27
7	7356.00	53.1 PK	74.0	-20.9	1.00 H	340	4.83	48.27
8	7356.00	42.9 AV	54.0	-11.1	1.00 H	340	-5.37	48.27

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	89.6 PK			1.75 V	212	55.89	33.71
2	*2452.00	77.8 AV			1.75 V	212	44.09	33.71
3	2483.50	58.5 PK	74.0	-15.5	1.75 V	212	24.69	33.81
4	2483.50	42.3 AV	54.0	-11.7	1.75 V	212	8.49	33.81
5	4904.00	48.1 PK	74.0	-25.9	1.28 V	133	4.83	43.27
6	4904.00	37.3 AV	54.0	-16.7	1.28 V	133	-5.97	43.27
7	7356.00	53.2 PK	74.0	-20.8	1.12 V	213	4.93	48.27
8	7356.00	41.9 AV	54.0	-12.1	1.12 V	213	-6.37	48.27

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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4.2.8 TEST RESULTS (BT<LE>)

BELOW 1GHz WORST-CASE DATA

BT_LE-GFSK

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	142.75	36.4 QP	43.5	-7.1	1.45 H	102	49.32	-12.88
2	156.23	38.7 QP	43.5	-4.8	1.21 H	274	51.27	-12.61
3	160.36	36.5 QP	43.5	-7.1	1.21 H	66	49.18	-12.73
4	241.11	36.5 QP	46.0	-9.5	1.44 H	54	50.34	-13.83
5	298.84	40.9 QP	46.0	-5.2	1.46 H	88	52.56	-11.71
6	360.23	40.7 QP	46.0	-5.3	1.55 H	36	50.65	-9.96

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.34	33.9 QP	40.0	-6.1	1.42 V	85	47.31	-13.41
2	63.45	33.9 QP	40.0	-6.2	1.52 V	134	47.32	-13.47
3	173.21	36.7 QP	43.5	-6.8	1.42 V	98	50.29	-13.55
4	214.00	36.7 QP	43.5	-6.9	1.74 V	132	52.11	-15.46
5	301.10	37.7 QP	46.0	-8.4	1.24 V	75	49.26	-11.61
6	329.10	40.9 QP	46.0	-5.2	1.78 V	98	51.49	-10.64

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



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ABOVE 1GHz WORST-CASE DATA

BT_LE-GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	48.7 PK	74.0	-25.3	1.09 H	142	15.17	33.53
2	2390.00	38.5 AV	54.0	-15.5	1.09 H	142	4.97	33.53
3	*2402.00	101.6 PK			1.09 H	142	68.04	33.56
4	*2402.00	87.3 AV			1.09 H	142	53.74	33.56
5	4804.00	54.6 PK	74.0	-19.4	1.55 H	292	11.44	43.16
6	4804.00	44.3 AV	54.0	-9.7	1.55 H	292	1.14	43.16

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	47.6 PK	74.0	-26.4	1.07 V	90	14.07	33.53
2	2390.00	38.2 AV	54.0	-15.8	1.07 V	90	4.67	33.53
3	*2402.00	96.6 PK			1.07 V	90	63.04	33.56
4	*2402.00	82.2 AV			1.07 V	90	48.64	33.56
5	4804.00	54.3 PK	74.0	-19.7	1.08 V	300	11.14	43.16
6	4804.00	45.6 AV	54.0	-8.4	1.08 V	300	2.44	43.16

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	101.8 PK			1.08 H	154	68.12	33.68
2	*2440.00	88.2 AV			1.08 H	154	54.52	33.68
3	4880.00	54.7 PK	74.0	-19.3	1.53 H	296	11.46	43.24
4	4880.00	44.5 AV	54.0	-9.5	1.53 H	296	1.26	43.24
5	7320.00	55.8 PK	74.0	-18.2	1.00 H	216	7.69	48.11
6	7320.00	44.5 AV	54.0	-9.5	1.00 H	216	-3.61	48.11

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	96.8 PK			1.08 V	95	63.12	33.68
2	*2440.00	83.1 AV			1.08 V	95	49.42	33.68
3	4880.00	54.2 PK	74.0	-19.8	1.08 V	298	10.96	43.24
4	4880.00	45.5 AV	54.0	-8.5	1.08 V	298	2.26	43.24
5	7320.00	55.3 PK	74.0	-18.7	1.06 V	121	7.19	48.11
6	7320.00	44.0 AV	54.0	-10.0	1.06 V	121	-4.11	48.11

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	102.9 PK			1.08 H	154	69.10	33.80
2	*2480.00	89.6 AV			1.08 H	154	55.80	33.80
3	2483.50	50.6 PK	74.0	-23.4	1.08 H	154	16.79	33.81
4	2483.50	38.7 AV	54.0	-15.3	1.08 H	154	4.89	33.81
5	4960.00	55.1 PK	74.0	-18.9	1.49 H	310	11.83	43.27
6	4960.00	44.7 AV	54.0	-9.3	1.49 H	310	1.43	43.27
7	7440.00	55.4 PK	74.0	-18.6	1.00 H	203	6.90	48.50
8	7440.00	44.3 AV	54.0	-9.7	1.00 H	203	-4.20	48.50

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	97.8 PK			1.09 V	96	64.00	33.80
2	*2480.00	84.3 AV			1.09 V	96	50.50	33.80
3	2483.50	48.2 PK	74.0	-25.8	1.09 V	96	14.39	33.81
4	2483.50	38.4 AV	54.0	-15.6	1.09 V	96	4.59	33.81
5	4960.00	54.4 PK	74.0	-19.6	1.12 V	296	11.13	43.27
6	4960.00	45.6 AV	54.0	-8.4	1.12 V	296	2.33	43.27
7	7440.00	55.4 PK	74.0	-18.6	1.07 V	119	6.90	48.50
8	7440.00	44.3 AV	54.0	-9.7	1.07 V	119	-4.20	48.50

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2014	Jan. 20, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Feb. 07 to 11, 2014

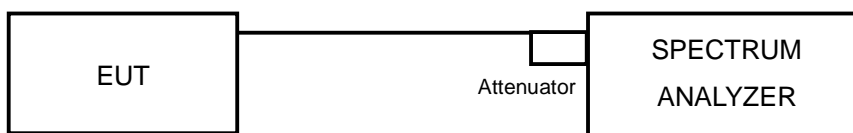
4.3.3 TEST PROCEDURE

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

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



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4.3.7 TEST RESULTS

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.11	0.5	PASS
6	2437	10.12	0.5	PASS
11	2462	10.13	0.5	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.62	0.5	PASS
6	2437	16.61	0.5	PASS
11	2462	16.61	0.5	PASS

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	17.80	17.74	0.5	PASS
6	2437	17.81	17.74	0.5	PASS
11	2462	17.74	17.78	0.5	PASS

802.11n (HT40)

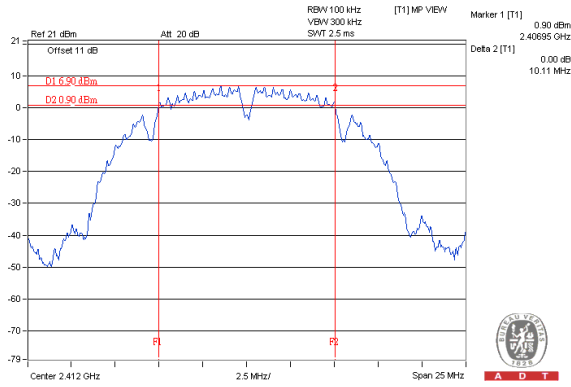
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
3	2422	36.52	36.52	0.5	PASS
6	2437	36.57	36.57	0.5	PASS
9	2452	36.54	36.53	0.5	PASS



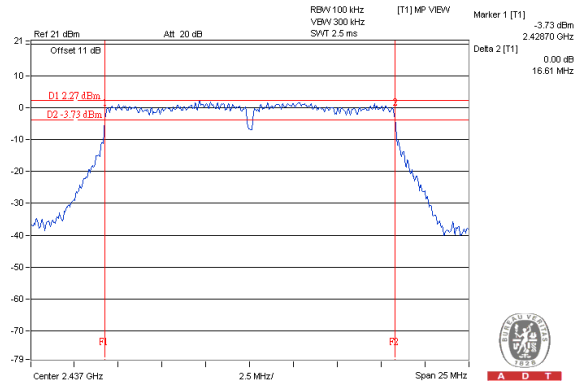
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SPECTRUM PLOT OF WORST VALUE

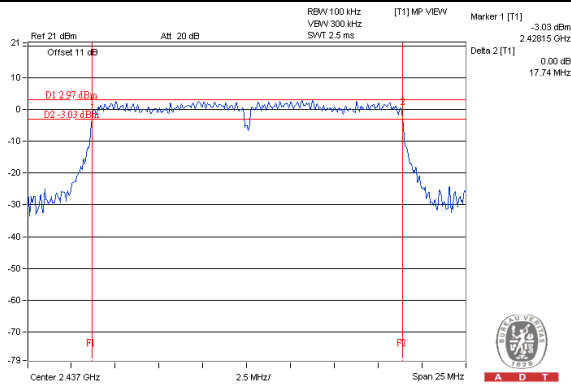
802.11b / CH1



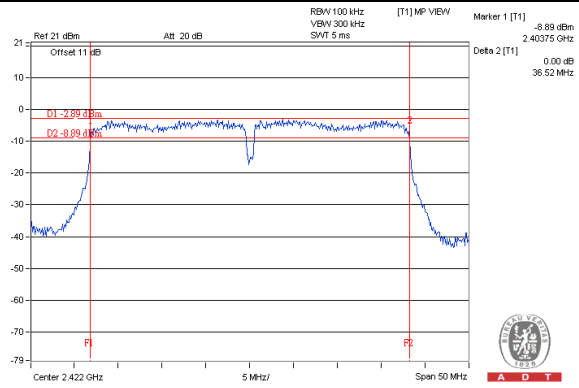
802.11g / CH6



802.11n (HT20) / Chain(1) : CH6



802.11n (HT40) / Chain(1) : CH3

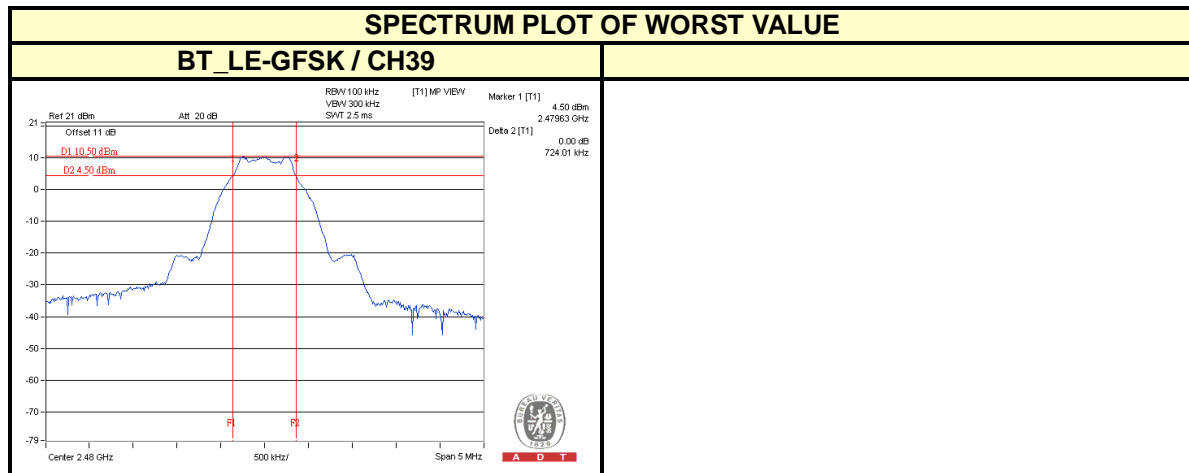




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BT_LE-GFSK

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	0.72	0.5	PASS
19	2440	0.72	0.5	PASS
39	2480	0.72	0.5	PASS



4.4 CONDUCTED OUTPUT POWER MEASUREMENT

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT \leq 4;

Array Gain = 0 dB (i.e., no array gain) for channel widths \geq 40 MHz for any NANT;

Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT \geq 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

4.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power meter Anritsu	ML2495A	0824006	May 20, 2013	May 19, 2014
Power sensor Anritsu	MA2411B	0738172	May 20, 2013	May 19, 2014

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Feb. 07 to 11, 2014

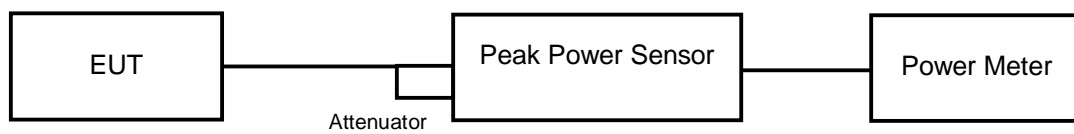
4.4.3 TEST PROCEDURES

The peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the peak power level.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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4.4.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	95.719	19.81	30	PASS
6	2437	98.401	19.93	30	PASS
11	2462	94.842	19.77	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	470.977	26.73	30	PASS
6	2437	374.973	25.74	30	PASS
11	2462	465.586	26.68	30	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	24.41	25.11	600.398	27.78	30	PASS
6	2437	25.64	26.33	795.974	29.01	30	PASS
11	2462	23.64	23.79	470.538	26.73	30	PASS

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
3	2422	22.91	24.72	491.917	26.92	30	PASS
6	2437	23.31	25.01	531.246	27.25	30	PASS
9	2452	23.04	24.61	490.440	26.91	30	PASS

BT_LE-GFSK

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
0	2402	14.825	11.71	30	PASS
19	2440	16.368	12.14	30	PASS
39	2480	17.539	12.44	30	PASS



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4.5 AVERAGE OUTPUT POWER

4.5.1 FOR REFERENCE.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	1014008	Apr. 23, 2013	Apr. 22, 2014
Power Sensor	MA2411B	0917122	Apr. 23, 2013	Apr. 22, 2014

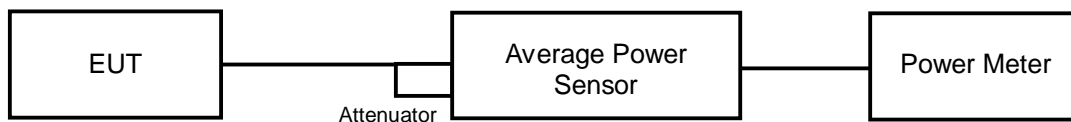
Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Feb. 07 to 11, 2014

4.5.3 TEST PROCEDURES

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.5.4 TEST SETUP



4.5.5 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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4.5.6 TEST RESULTS

802.11b

CHAN.	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	49.204	16.92
6	2437	48.306	16.84
11	2462	49.545	16.95

802.11g

CHAN.	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	48.306	16.84
6	2437	42.267	16.26
11	2462	47.973	16.81

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	15.33	16.22	75.998	18.81
6	2437	16.63	17.21	98.628	19.94
11	2462	14.54	15.03	60.287	17.80

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
3	2422	14.51	15.17	61.134	17.86
6	2437	15.11	15.43	67.348	18.28
9	2452	14.73	15.14	62.376	17.95



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BT_LE-GFSK

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
0	2402	13.459	11.29
19	2440	14.825	11.71
39	2480	15.922	12.02

4.6 POWER SPECTRAL DENSITY MEASUREMENT

4.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2014	Jan. 20, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Feb. 07 to 11, 2014

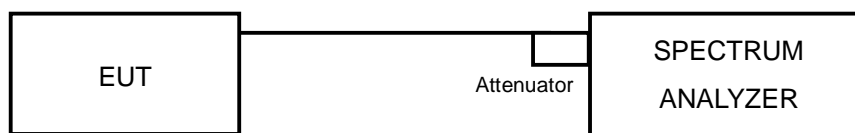
4.6.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW =10 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum amplitude level.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-7.62	8	PASS
6	2437	-7.79	8	PASS
11	2462	-8.88	8	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-10.10	8	PASS
6	2437	-10.73	8	PASS
11	2462	-11.02	8	PASS

802.11n (HT20)

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-11.44	3.01	-8.43	8	PASS
	6	2437	-9.60	3.01	-6.59	8	PASS
	11	2462	-11.69	3.01	-8.68	8	PASS
1	1	2412	-10.55	3.01	-7.54	8	PASS
	6	2437	-9.52	3.01	-6.51	8	PASS
	11	2462	-11.92	3.01	-8.91	8	PASS

802.11n (HT40)

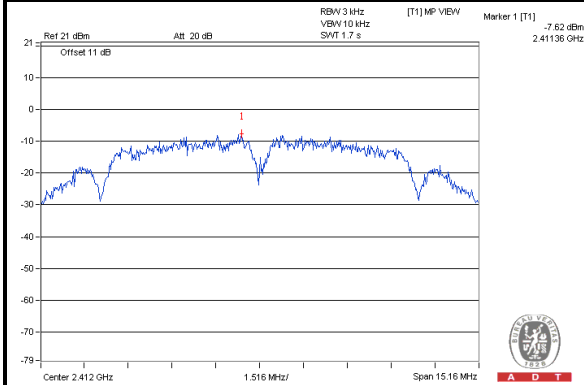
TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	3	2422	-15.77	3.01	-12.76	8	PASS
	6	2437	-13.57	3.01	-10.56	8	PASS
	9	2452	-15.29	3.01	-12.28	8	PASS
1	3	2422	-15.10	3.01	-12.09	8	PASS
	6	2437	-13.42	3.01	-10.41	8	PASS
	9	2452	-16.03	3.01	-13.02	8	PASS



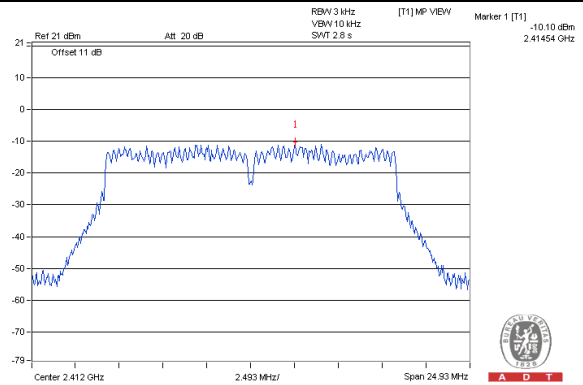
A D T

SPECTRUM PLOT OF WORST VALUE

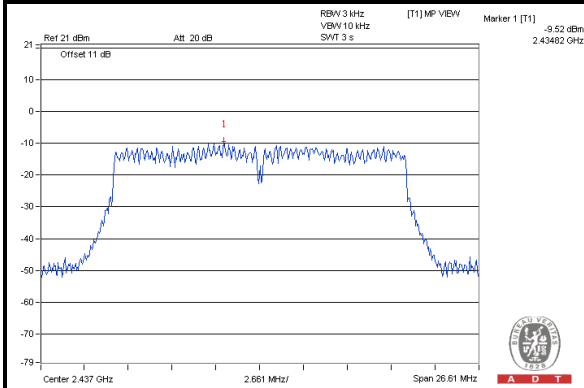
802.11b / CH1



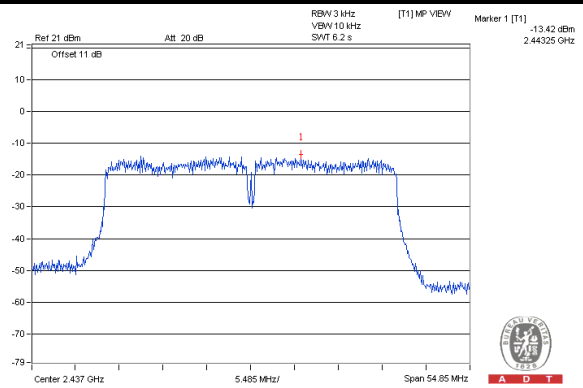
802.11g / CH1



802.11n (HT20) / Chain(1) : CH6



802.11n (HT40) / Chain(1) : CH6

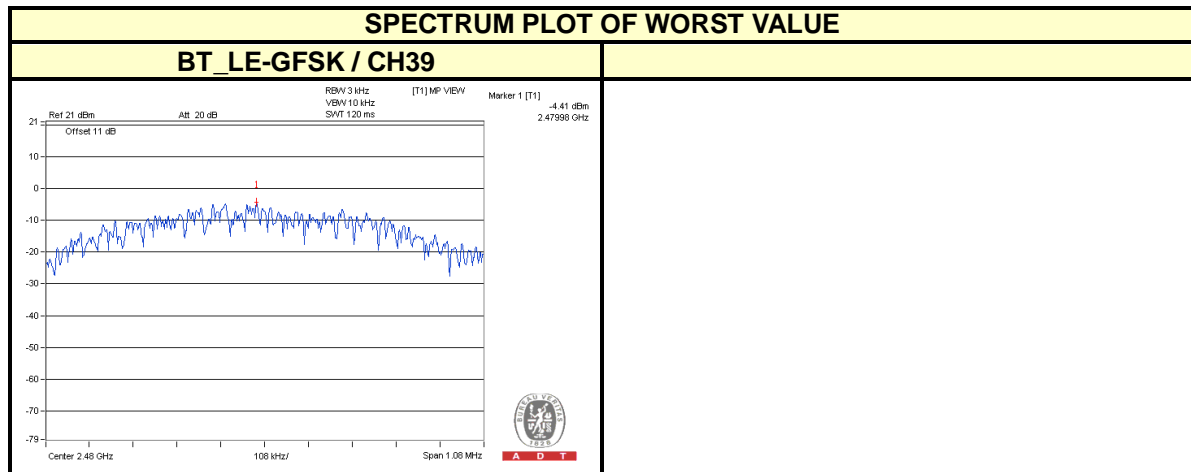




A D T

BT_LE-GFSK

Channel	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	2402	-4.98	8	PASS
19	2440	-4.54	8	PASS
39	2480	-4.41	8	PASS





A D T

4.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.7.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2014	Jan. 20, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Feb. 07 to 11, 2014

4.7.3 TEST PROCEDURE

Measurement Procedure - Reference Level

1. Set the RBW = 100 kHz.
2. Set the VBW \geq 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

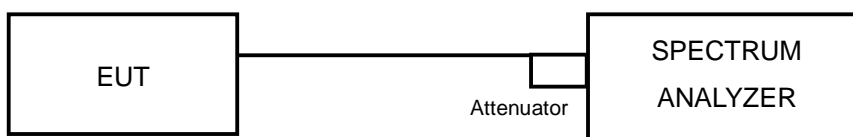
Measurement Procedure –Unwanted Emission Level

1. Set RBW = 100 kHz.
2. Set VBW \geq 300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



4.7.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.7.7 TEST RESULTS

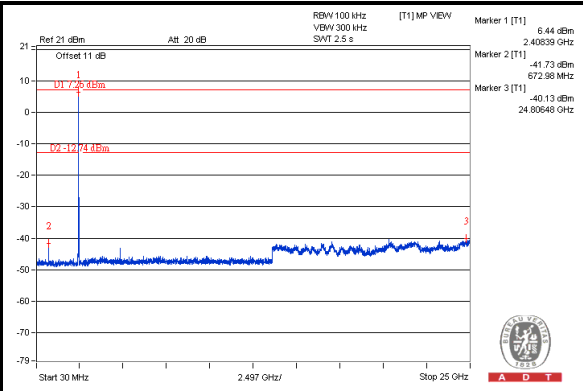
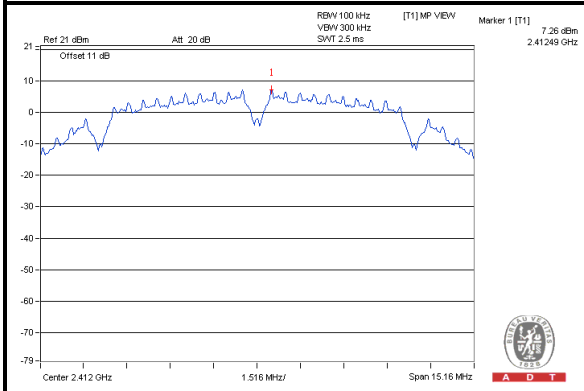
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



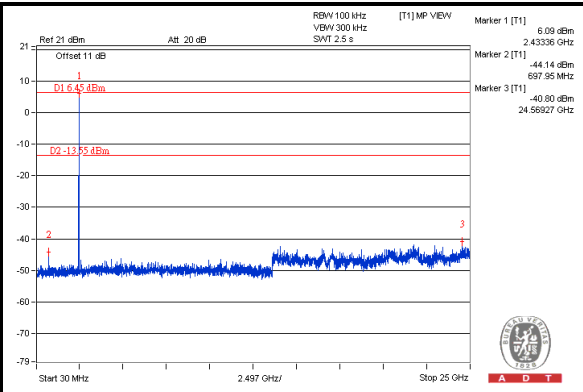
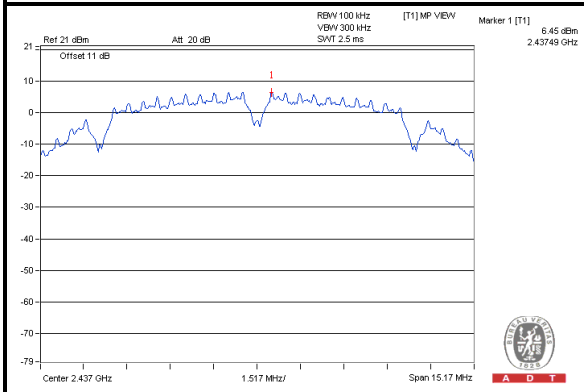
A D T

802.11b

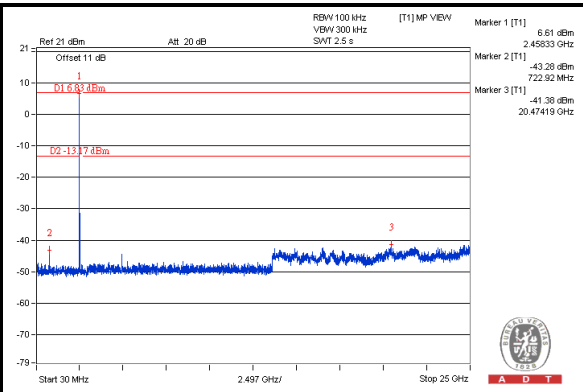
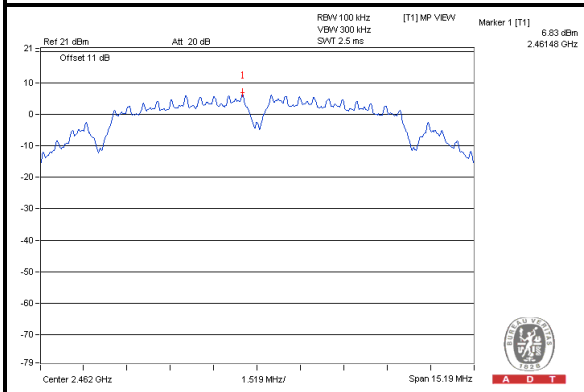
CH 1



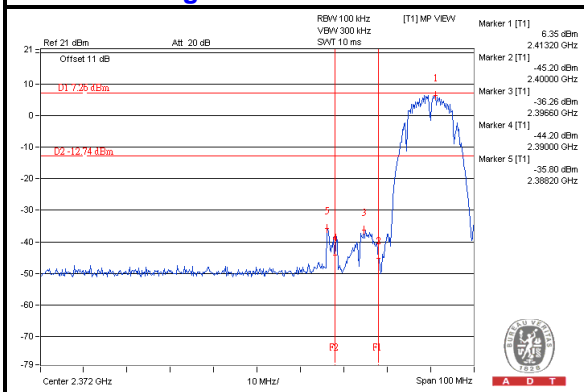
CH 6



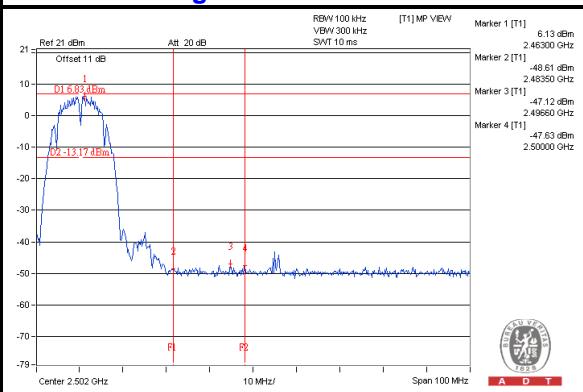
CH 11



CH 1 Band edge



CH 11 Band edge

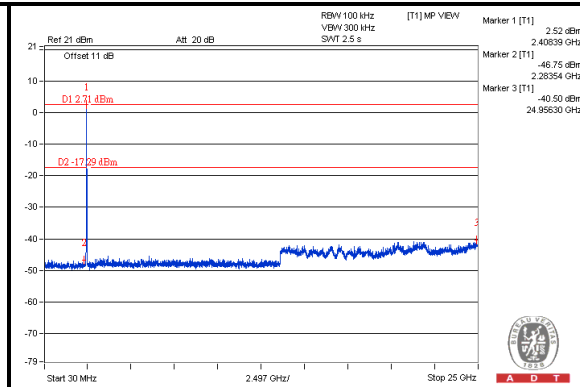
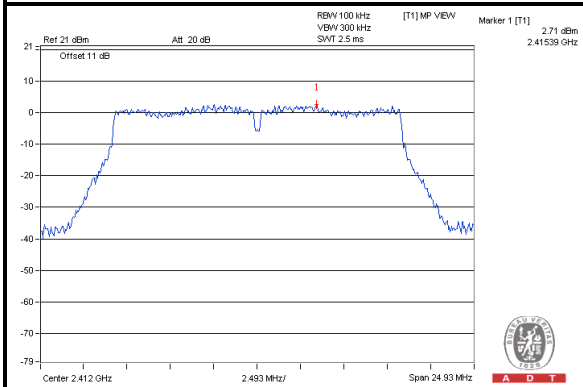




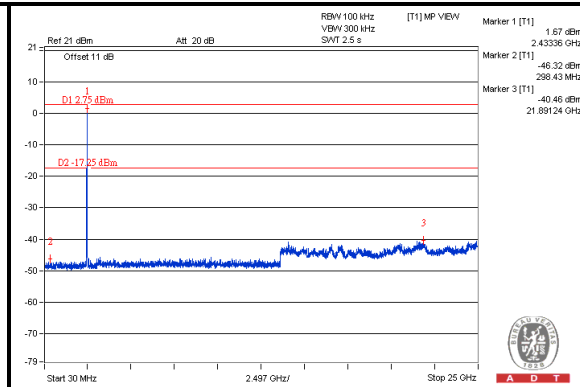
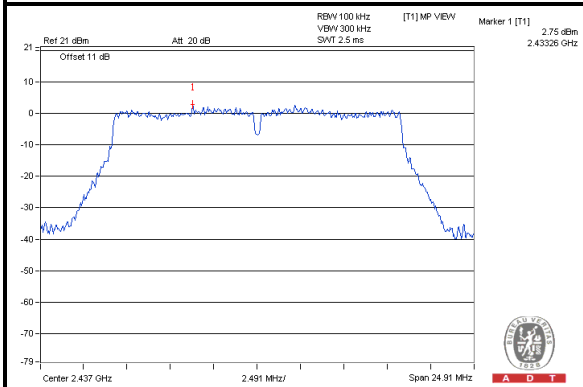
A D T

802.11g

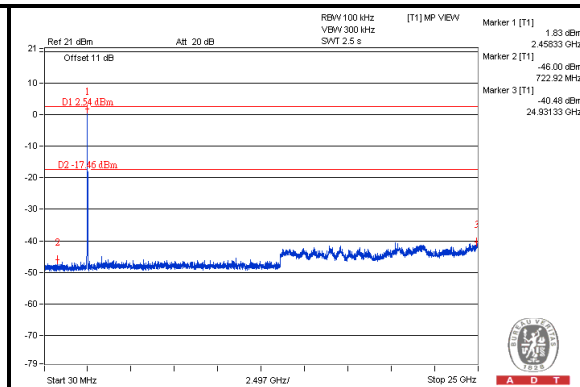
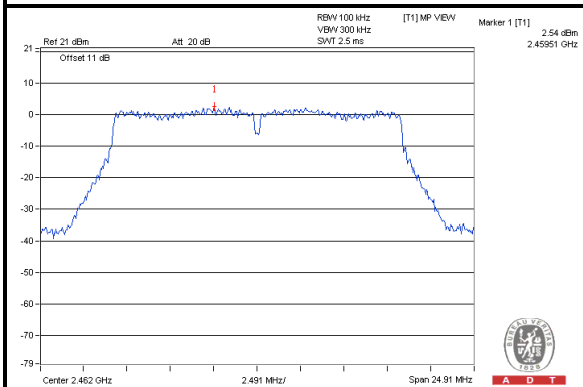
CH 1



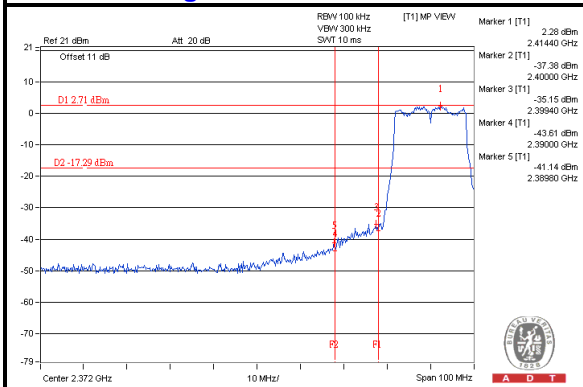
CH 6



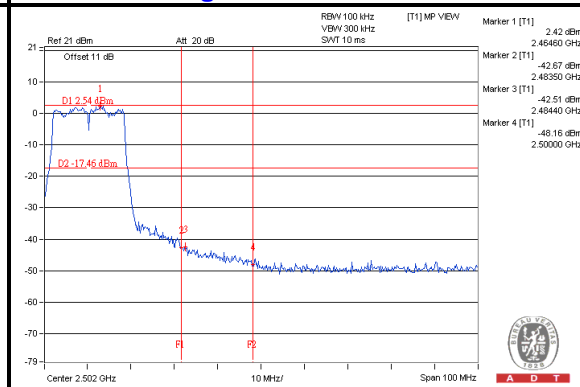
CH 11



CH 1 Band edge



CH 11 Band edge

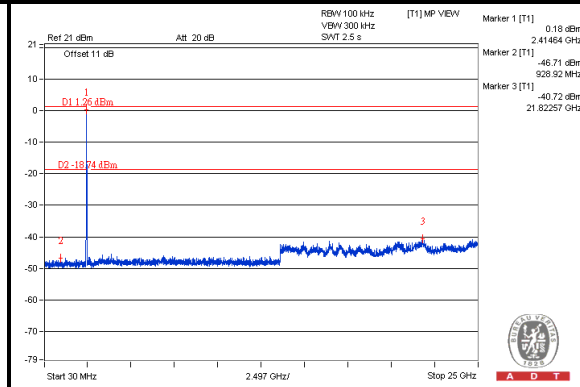
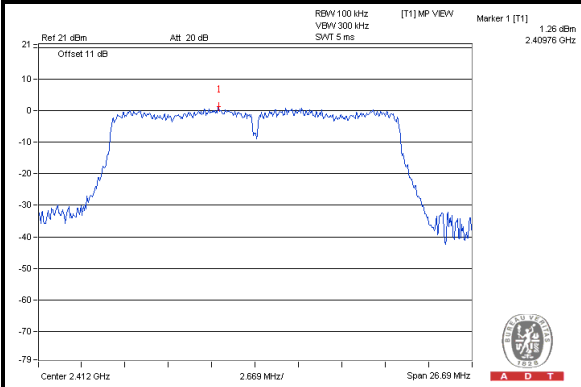




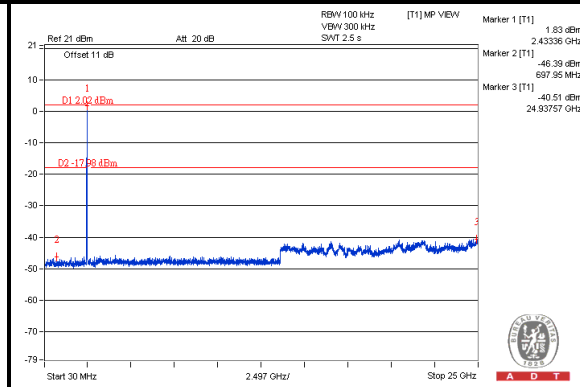
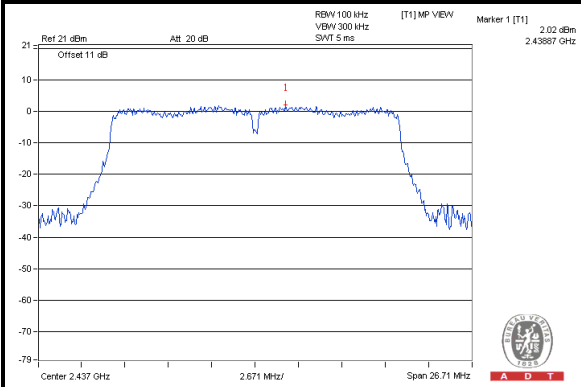
A D T

For Chain (0): 802.11n(HT20)

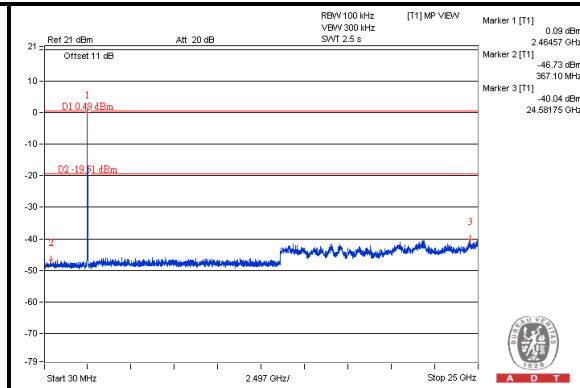
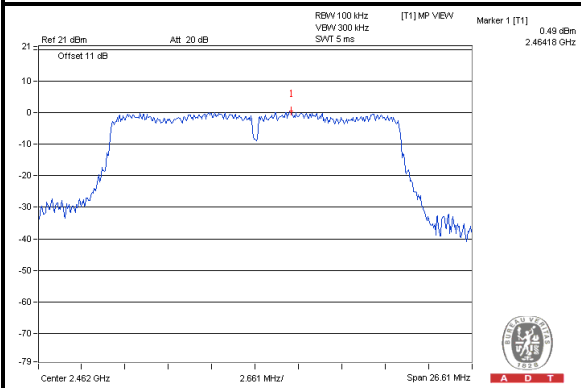
CH 1



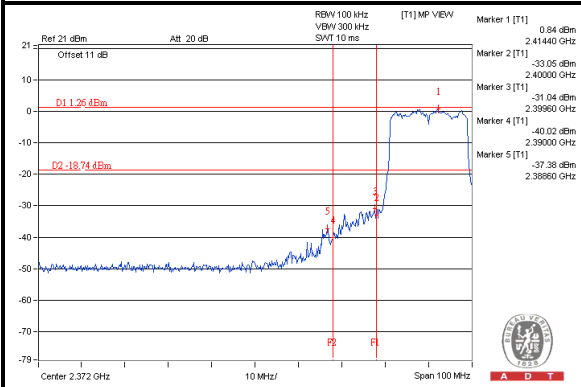
CH 6



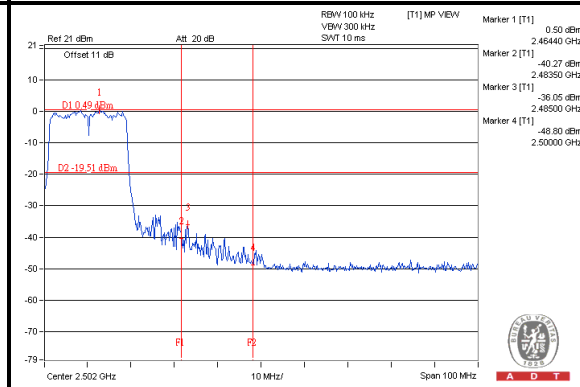
CH 11



CH 1 Band edge



CH 11 Band edge

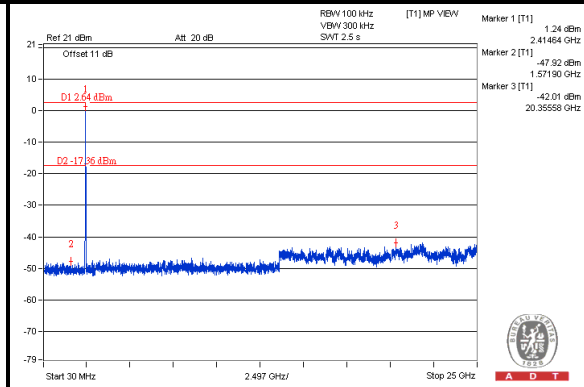
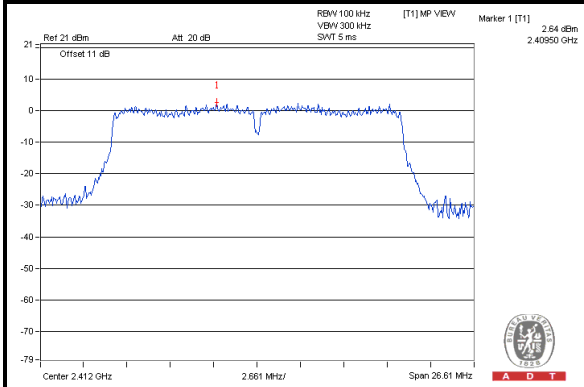




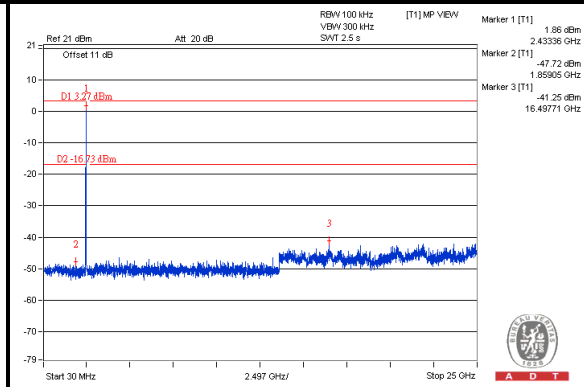
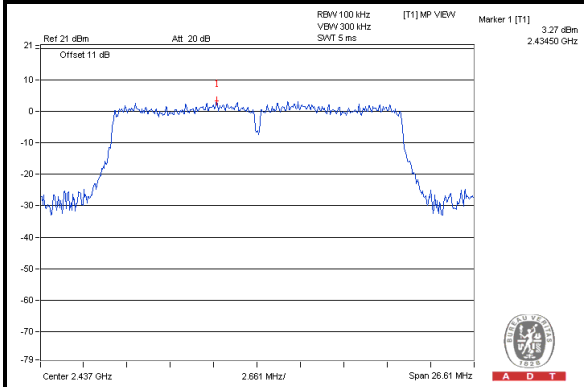
A D T

For Chain (1): 802.11n(HT20)

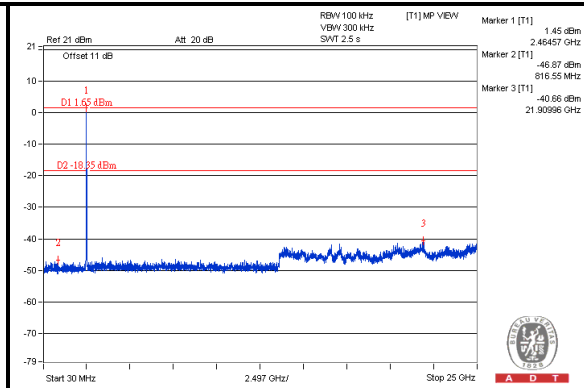
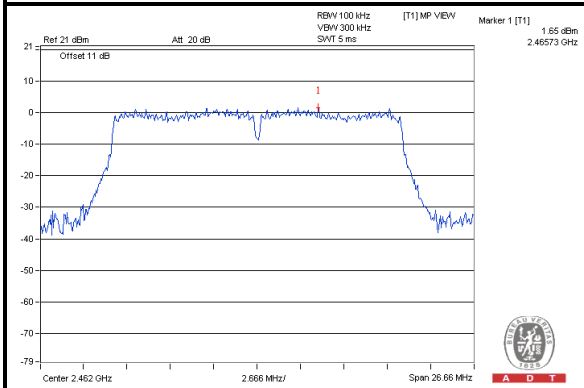
CH 1



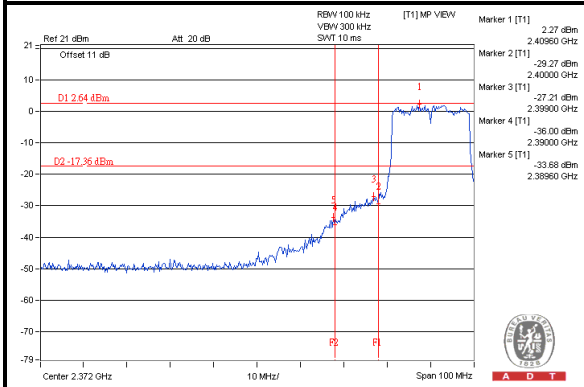
CH 6



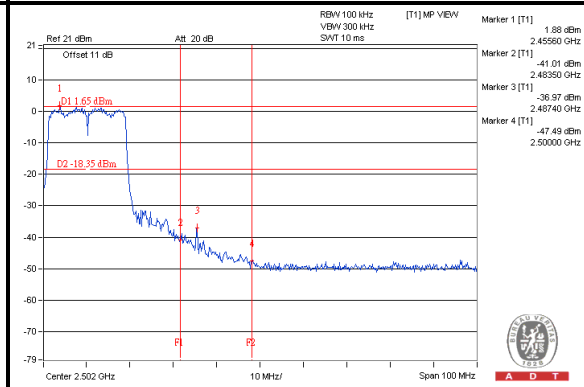
CH 11



CH 1 Band edge



CH 11 Band edge

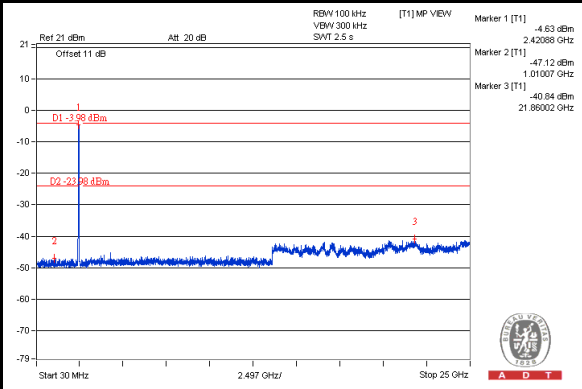
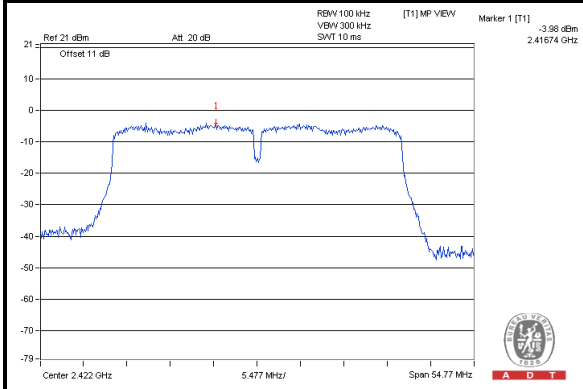




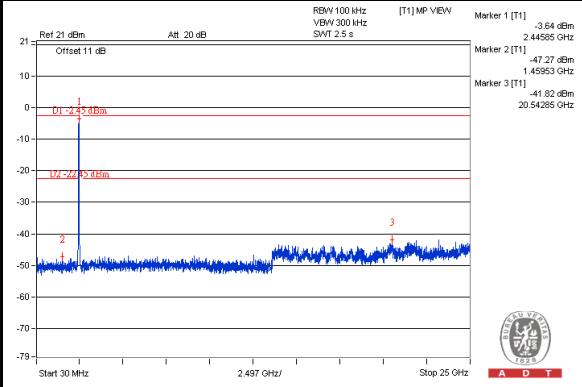
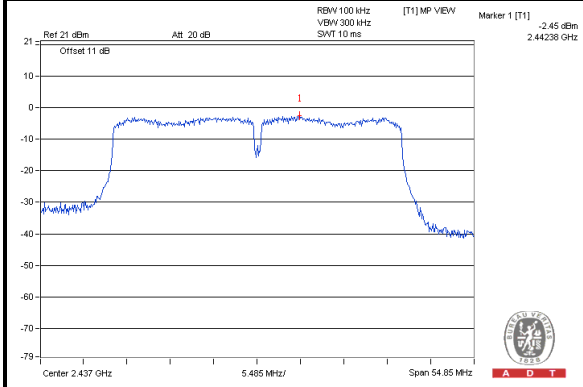
A D T

For Chain (0): 802.11n(HT40)

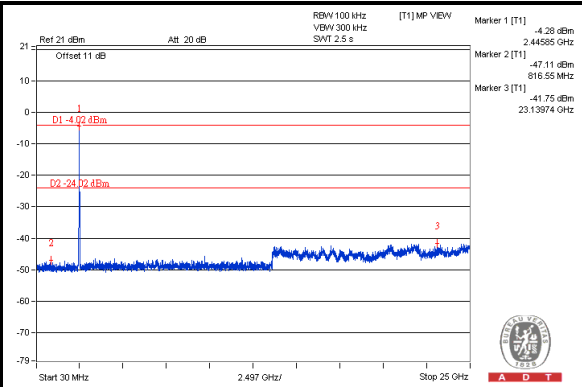
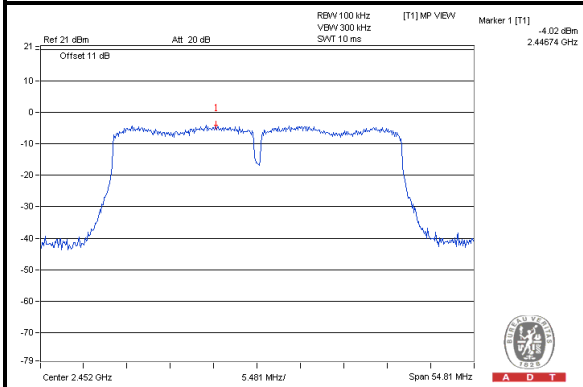
CH 3



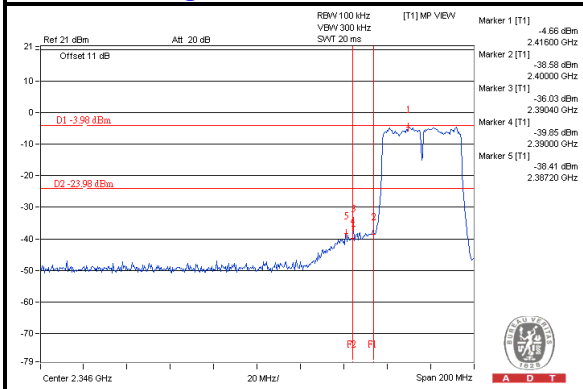
CH 6



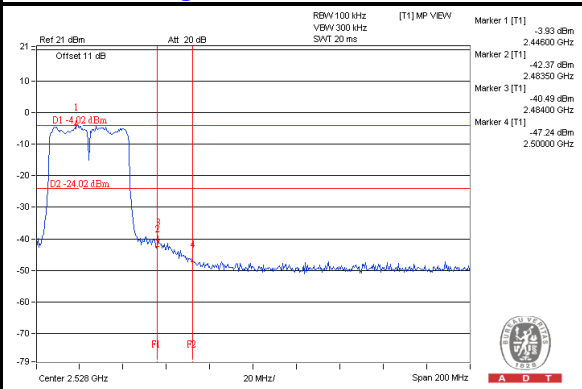
CH 9



CH 3 Band edge



CH 9 Band edge

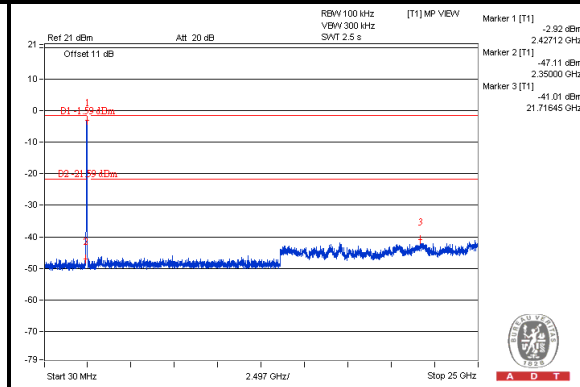
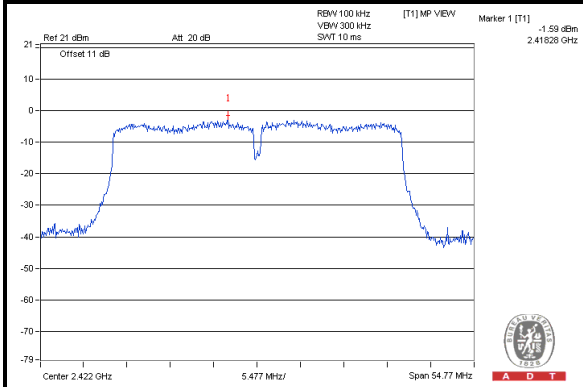




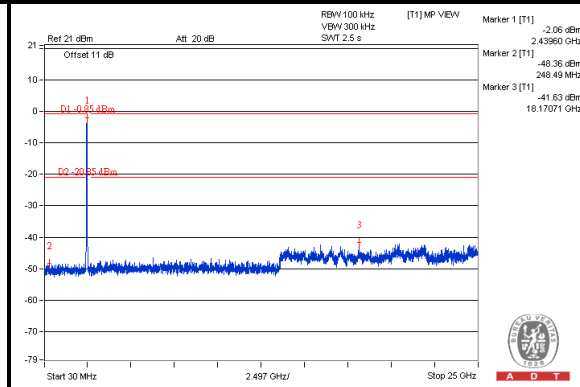
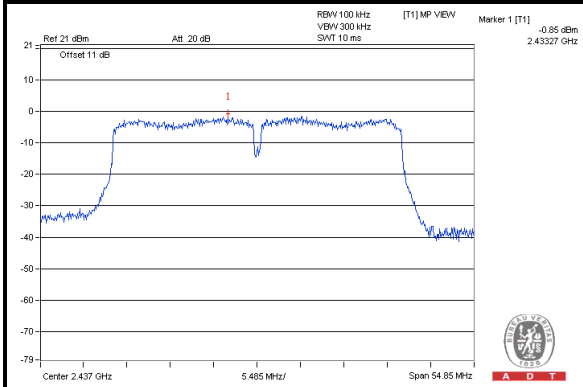
A D T

For Chain (1): 802.11n(HT40)

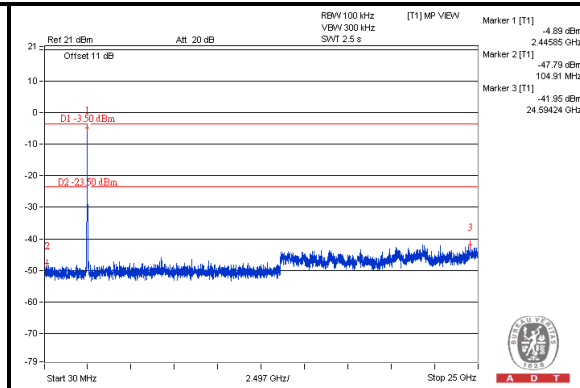
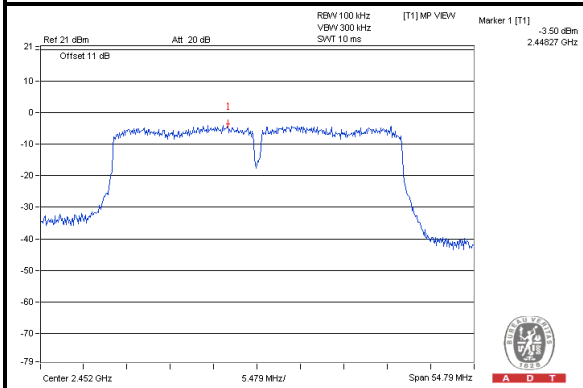
CH 3



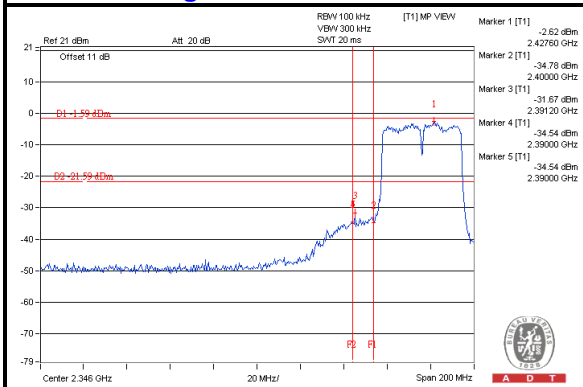
CH 6



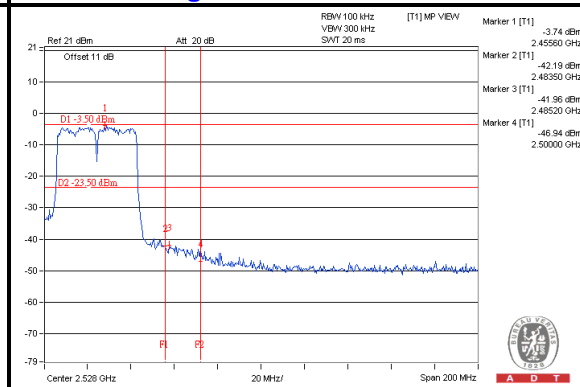
CH 9



CH 3 Band edge



CH 9 Band edge

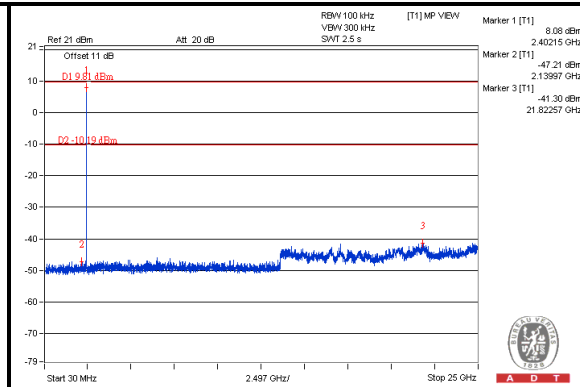
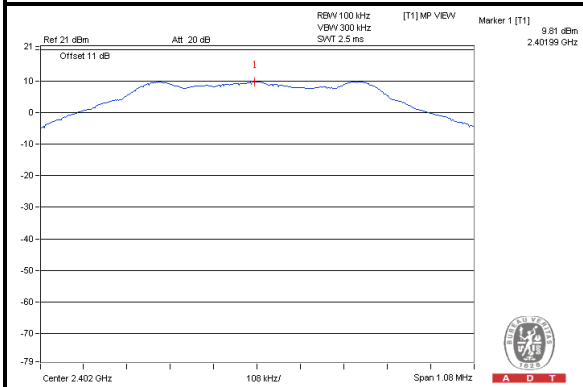




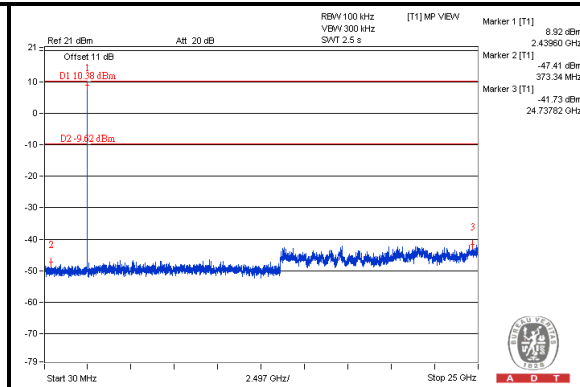
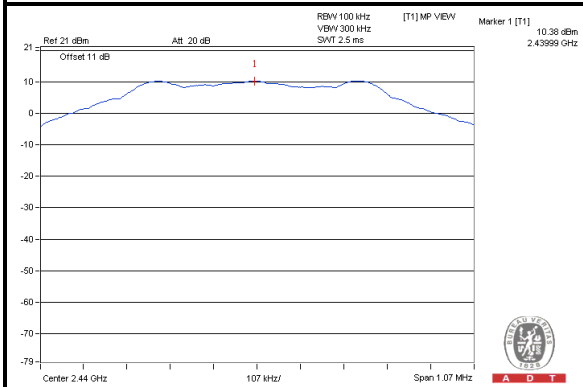
A D T

BT LE-GFSK

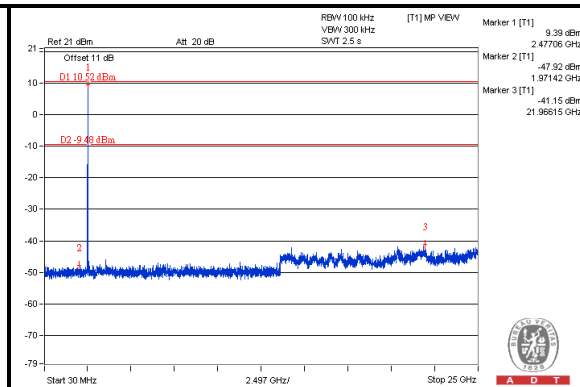
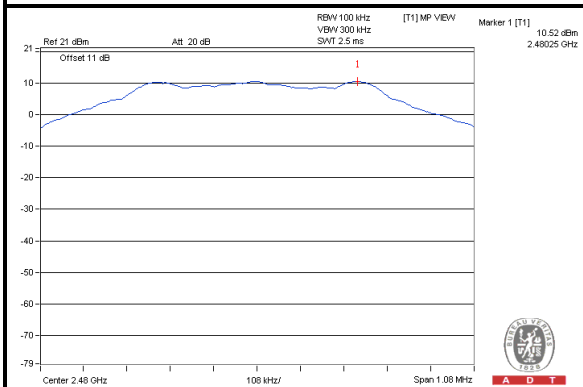
CH 0



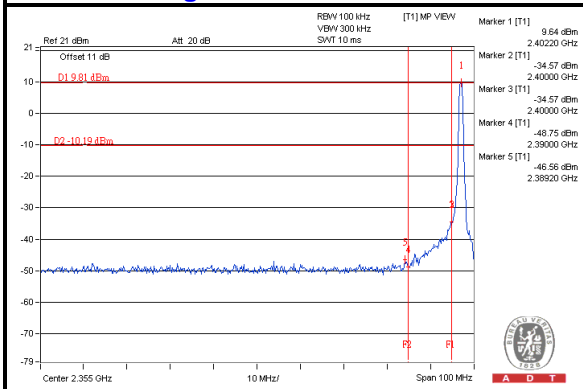
CH 19



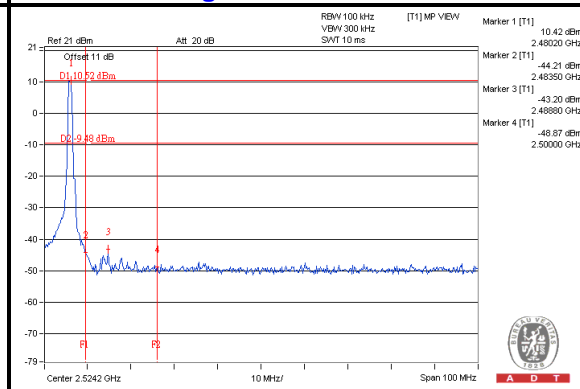
CH 39



CH 0 Band edge



CH 39 Band edge





A D T

5. TEST TYPES AND RESULTS (FOR 5GHz, 5.725~5.850GHz Band)

5.1 CONDUCTED EMISSION MEASUREMENT

5.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

5.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 05, 2013	Sep. 04, 2014
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 06, 2013	June 05, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-03	Sep. 24, 2013	Sep. 23, 2014
Software ADT	BV ADT_Cond_V7.3.7. 3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: Feb. 12, 2014

5.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN.
- b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- d. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit – 20dB) were not recorded.

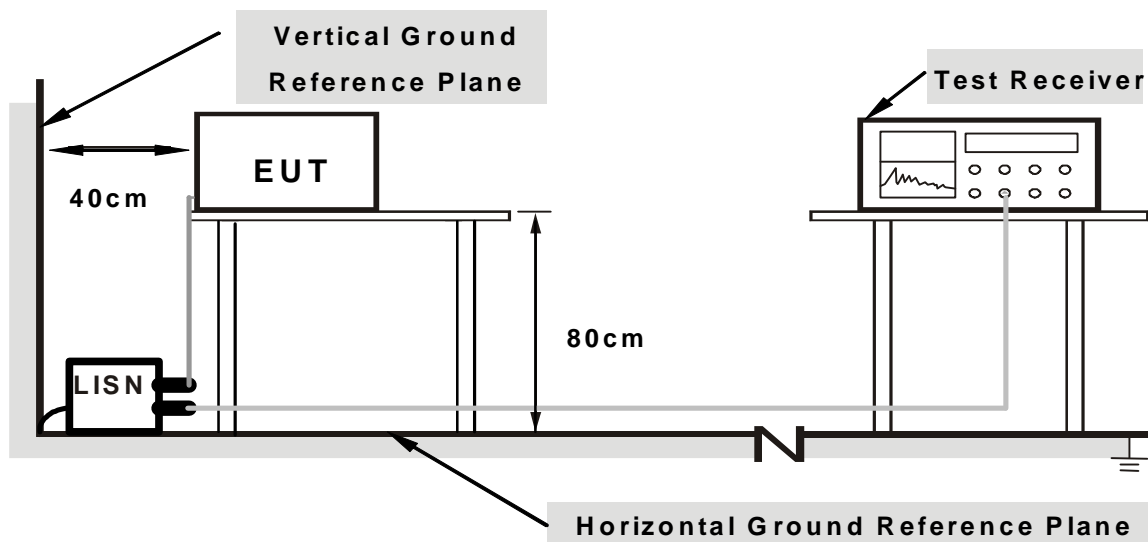
NOTE:

1. The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

5.1.4 DEVIATION FROM TEST STANDARD

No deviation

5.1.5 TEST SETUP



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

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

5.1.6 EUT OPERATING CONDITIONS

Same as the 4.1.6

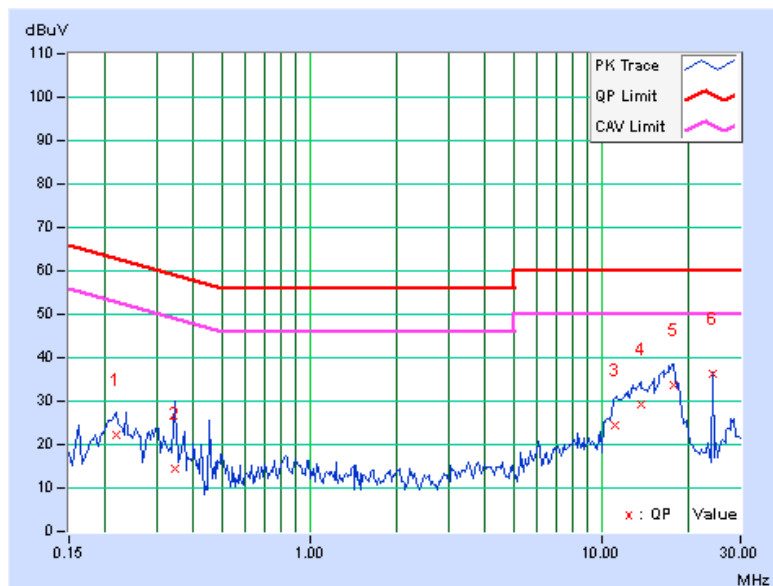
5.1.7 TEST RESULTS

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.21641	0.10	22.04	15.28	22.14	15.38	62.96	52.96	-40.81	-37.57
2	0.34531	0.13	14.48	-0.10	14.61	0.03	59.07	49.07	-44.47	-49.05
3	11.11328	0.50	23.99	19.18	24.49	19.68	60.00	50.00	-35.51	-30.32
4	13.62109	0.58	28.68	24.76	29.26	25.34	60.00	50.00	-30.74	-24.66
5	17.70313	0.67	32.88	28.01	33.55	28.68	60.00	50.00	-26.45	-21.32
6	24.00000	0.83	35.34	35.28	36.17	36.11	60.00	50.00	-23.83	-13.89

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

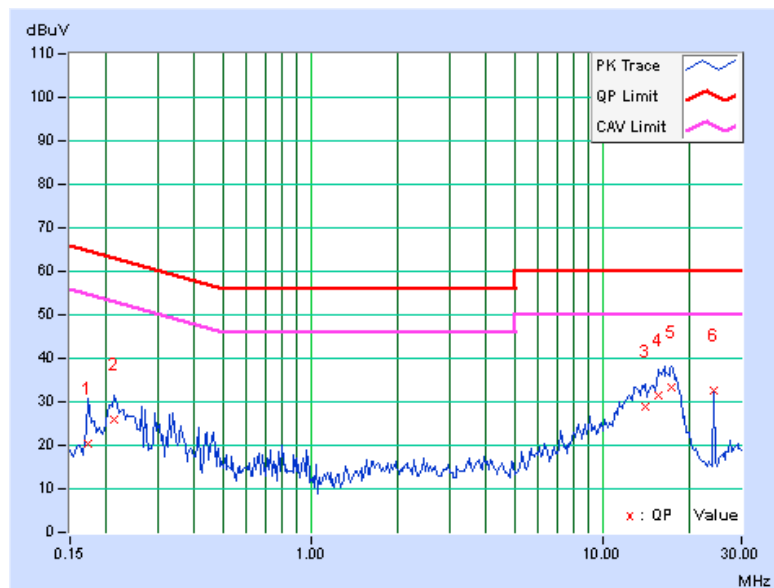


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17344	0.09	20.38	11.87	20.47	11.96	64.79	54.79	-44.32	-42.83
2	0.21250	0.10	25.82	19.52	25.92	19.62	63.11	53.11	-37.18	-33.48
3	13.99219	0.59	28.24	23.85	28.83	24.44	60.00	50.00	-31.17	-25.56
4	15.48047	0.62	30.84	26.63	31.46	27.25	60.00	50.00	-28.54	-22.75
5	17.32031	0.65	32.74	28.07	33.39	28.72	60.00	50.00	-26.61	-21.28
6	24.00000	0.82	31.71	30.49	32.53	31.31	60.00	50.00	-27.47	-18.69

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value





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5.2 RADIATED AND BANDEGE EMISSION MEASUREMENT

5.2.1 LIMITS OF RADIATED AND BANDEGE EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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5.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 15, 2014	Jan. 14, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
RF Cable	NA	CHHCAB_001	Oct. 06, 2013	Oct. 05, 2014
Spectrum Analyzer R&S	FSV40	100964	July 15, 2013	July 14, 2014
Horn_Antenna AISi	AIH.8018	0000220091110	Dec. 06, 2013	Dec. 05, 2014
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 29, 2013	Oct. 28, 2014
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 12, 2013	Dec. 11, 2014
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKka-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5. The CANADA Site Registration No. is IC 7450H-3.
6. Tested Date: Feb. 08, 2014

5.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

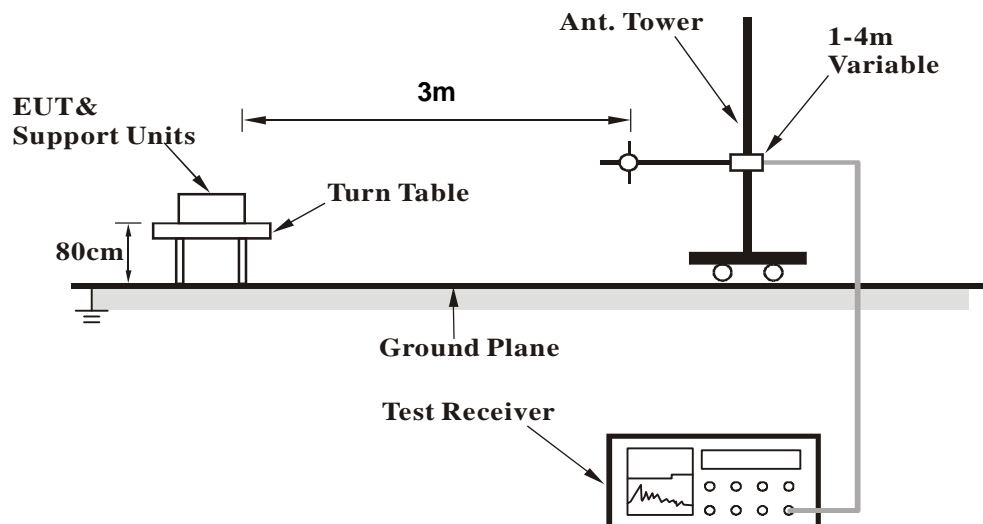
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

5.2.4 DEVIATION FROM TEST STANDARD

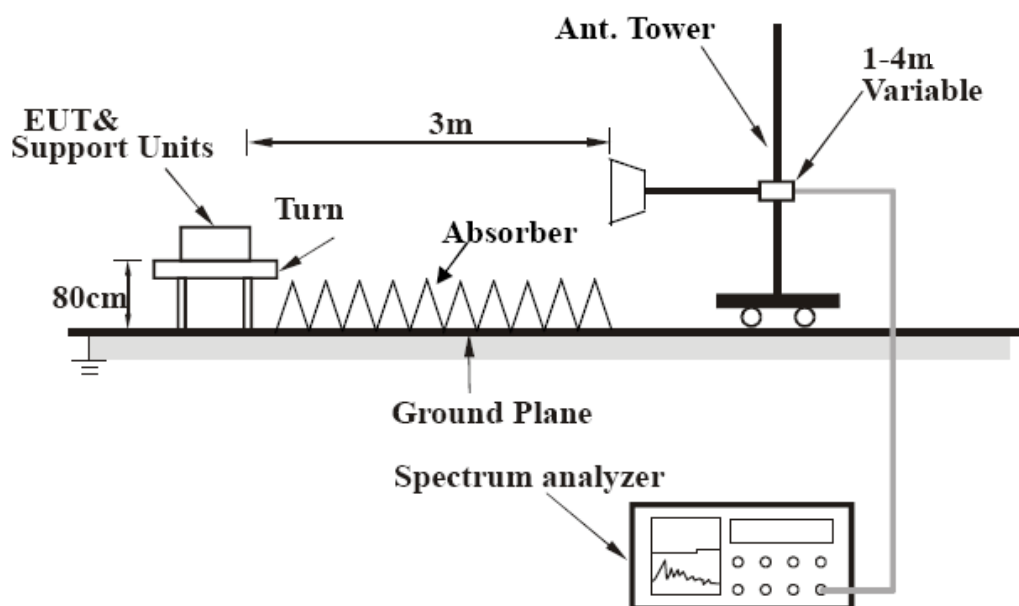
No deviation

5.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

5.2.6 EUT OPERATING CONDITIONS

Same as the 4.1.6

5.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11ac (VHT20)

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	143.45	37.5 QP	43.5	-6.0	1.75 H	120	50.23	-12.69
2	156.61	38.6 QP	43.5	-4.9	1.34 H	85	51.29	-12.67
3	160.37	36.6 QP	43.5	-6.9	1.65 H	99	49.29	-12.73
4	241.10	36.5 QP	46.0	-9.5	1.54 H	201	50.34	-13.83
5	298.71	40.2 QP	46.0	-5.8	1.65 H	301	51.92	-11.71
6	360.21	40.7 QP	46.0	-5.3	1.46 H	298	50.70	-9.96
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	59.61	32.2 QP	40.0	-7.8	1.25 V	134	45.67	-13.47
2	62.17	33.5 QP	40.0	-6.5	1.65 V	100	46.86	-13.32
3	176.21	37.0 QP	43.5	-6.5	1.45 V	245	51.09	-14.11
4	200.10	37.0 QP	43.5	-6.6	1.74 V	65	52.88	-15.93
5	300.10	37.9 QP	46.0	-8.2	1.65 V	145	49.52	-11.67
6	334.00	41.1 QP	46.0	-4.9	1.24 V	98	51.68	-10.58

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



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ABOVE 1GHz WORST-CASE DATA

802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5745.00	104.3 PK			1.01 H	54	59.82	44.48
2	*5745.00	94.2 AV			1.01 H	54	49.72	44.48
3	11490.00	55.3 PK	74.0	-18.7	1.00 H	26	3.68	51.62
4	11490.00	43.3 AV	54.0	-10.7	1.00 H	26	-8.32	51.62
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5745.00	106.5 PK			1.23 V	129	62.02	44.48
2	*5745.00	96.1 AV			1.23 V	129	51.62	44.48
3	11490.00	55.5 PK	74.0	-18.5	1.23 V	279	3.88	51.62
4	11490.00	43.1 AV	54.0	-10.9	1.23 V	279	-8.52	51.62

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.



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CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	104.3 PK			1.00 H	64	59.78	44.52
2	*5785.00	94.3 AV			1.00 H	64	49.78	44.52
3	11570.00	55.1 PK	74.0	-18.9	1.00 H	24	3.61	51.49
4	11570.00	42.9 AV	54.0	-11.1	1.00 H	24	-8.59	51.49

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	106.2 PK			1.27 V	116	61.68	44.52
2	*5785.00	95.9 AV			1.27 V	116	51.38	44.52
3	11570.00	55.3 PK	74.0	-18.7	1.25 V	261	3.81	51.49
4	11570.00	43.2 AV	54.0	-10.8	1.25 V	261	-8.29	51.49

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.



CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	103.8 PK			1.03 H	43	59.21	44.59
2	*5825.00	93.9 AV			1.03 H	43	49.31	44.59
3	11650.00	54.9 PK	74.0	-19.1	1.00 H	43	3.49	51.41
4	11650.00	42.9 AV	54.0	-11.1	1.00 H	43	-8.51	51.41

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	106.0 PK			1.19 V	128	61.41	44.59
2	*5825.00	95.8 AV			1.19 V	128	51.21	44.59
3	11650.00	55.3 PK	74.0	-18.7	1.28 V	268	3.89	51.41
4	11650.00	43.0 AV	54.0	-11.0	1.28 V	268	-8.41	51.41

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

802.11ac (VHT20)

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	55.6 PK	74.0	-18.4	1.00 H	37	11.52	44.08
2	5460.00	43.3 AV	54.0	-10.7	1.00 H	37	-0.78	44.08
3	*5745.00	105.5 PK			1.00 H	37	61.02	44.48
4	*5745.00	95.0 AV			1.00 H	37	50.52	44.48
5	11490.00	55.2 PK	74.0	-18.8	1.00 H	36	3.58	51.62
6	11490.00	43.2 AV	54.0	-10.8	1.00 H	36	-8.42	51.62
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	55.8 PK	74.0	-18.2	1.01 V	129	11.72	44.08
2	5460.00	44.2 AV	54.0	-9.8	1.01 V	129	0.12	44.08
3	*5745.00	108.3 PK			1.01 V	129	63.82	44.48
4	*5745.00	97.6 AV			1.01 V	129	53.12	44.48
5	11490.00	55.3 PK	74.0	-18.7	1.34 V	258	3.68	51.62
6	11490.00	43.2 AV	54.0	-10.8	1.34 V	258	-8.42	51.62

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.



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CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	106.2 PK			1.06 H	29	61.68	44.52
2	*5785.00	95.8 AV			1.06 H	29	51.28	44.52
3	11570.00	55.2 PK	74.0	-18.8	1.02 H	45	3.71	51.49
4	11570.00	43.1 AV	54.0	-10.9	1.02 H	45	-8.39	51.49

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	108.6 PK			1.00 V	137	64.08	44.52
2	*5785.00	98.0 AV			1.00 V	137	53.48	44.52
3	11570.00	56.0 PK	74.0	-18.0	1.04 V	140	4.51	51.49
4	11570.00	44.6 AV	54.0	-9.4	1.04 V	140	-6.89	51.49

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.



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CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	105.4 PK			1.02 H	34	60.81	44.59
2	*5825.00	94.8 AV			1.02 H	34	50.21	44.59
3	11650.00	54.1 PK	74.0	-19.9	1.48 H	223	2.69	51.41
4	11650.00	40.8 AV	54.0	-13.2	1.48 H	223	-10.61	51.41

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	108.0 PK			1.03 V	127	63.41	44.59
2	*5825.00	97.3 AV			1.03 V	127	52.71	44.59
3	11650.00	55.5 PK	74.0	-18.5	1.27 V	266	4.09	51.41
4	11650.00	43.3 AV	54.0	-10.7	1.27 V	266	-8.11	51.41

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.



A D T

802.11ac (VHT40)

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5755.00	101.4 PK			1.02 H	35	56.91	44.49
2	*5755.00	92.1 AV			1.02 H	35	47.61	44.49
3	11510.00	56.0 PK	74.0	-18.0	1.00 H	29	4.39	51.61
4	11510.00	43.5 AV	54.0	-10.5	1.00 H	29	-8.11	51.61

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5755.00	103.9 PK			1.03 V	127	59.41	44.49
2	*5755.00	94.3 AV			1.03 V	127	49.81	44.49
3	11510.00	56.2 PK	74.0	-17.8	1.00 V	142	4.59	51.61
4	11510.00	44.6 AV	54.0	-9.4	1.00 V	142	-7.01	51.61

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.



A D T

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	101.7 PK			1.07 H	40	57.16	44.54
2	*5795.00	92.2 AV			1.07 H	40	47.66	44.54
3	11590.00	55.6 PK	74.0	-18.4	1.02 H	23	4.16	51.44
4	11590.00	43.4 AV	54.0	-10.6	1.02 H	23	-8.04	51.44

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	104.6 PK			1.00 V	118	60.06	44.54
2	*5795.00	94.8 AV			1.00 V	118	50.26	44.54
3	11590.00	54.9 PK	74.0	-19.1	1.29 V	256	3.46	51.44
4	11590.00	42.9 AV	54.0	-11.1	1.29 V	256	-8.54	51.44

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

802.11ac (VHT80)

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5775.00	94.2 PK			1.07 H	40	49.68	44.52
2	*5775.00	83.1 AV			1.07 H	40	38.58	44.52
3	11550.00	55.4 PK	74.0	-18.6	1.00 H	42	3.88	51.52
4	11550.00	42.9 AV	54.0	-11.1	1.00 H	42	-8.62	51.52
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5775.00	96.4 PK			1.03 V	128	51.88	44.52
2	*5775.00	85.6 AV			1.03 V	128	41.08	44.52
3	11550.00	56.3 PK	74.0	-17.7	1.01 V	145	4.78	51.52
4	11550.00	44.6 AV	54.0	-9.4	1.01 V	145	-6.92	51.52

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

5.3 6dB BANDWIDTH MEASUREMENT

5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

5.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2014	Jan. 20, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Feb. 07, 2014

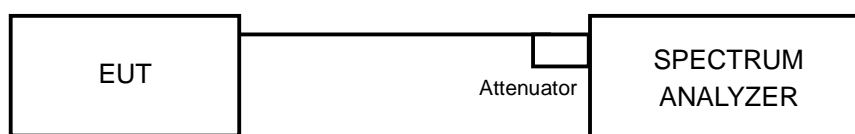
5.3.3 TEST PROCEDURE

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

5.3.4 DEVIATION FROM TEST STANDARD

No deviation

5.3.5 TEST SETUP



5.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



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5.3.7 TEST RESULTS

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	16.64	0.5	PASS
157	5785	16.60	0.5	PASS
165	5825	16.57	0.5	PASS

802.11ac(VHT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	17.76	17.73	0.5	PASS
157	5785	17.78	17.64	0.5	PASS
165	5825	17.57	17.70	0.5	PASS

802.11ac(VHT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
151	5755	36.52	36.53	0.5	PASS
159	5795	36.57	36.54	0.5	PASS

802.11ac (VHT80)

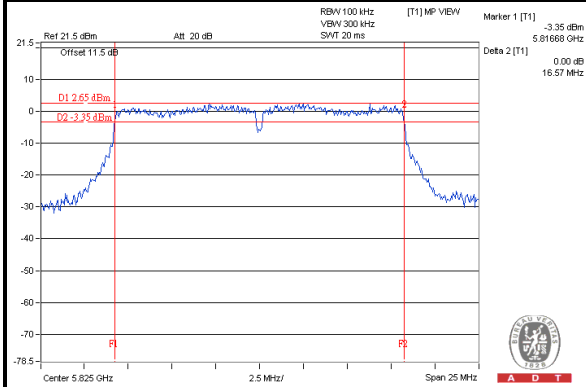
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
155	5775	76.89	76.81	0.5	PASS



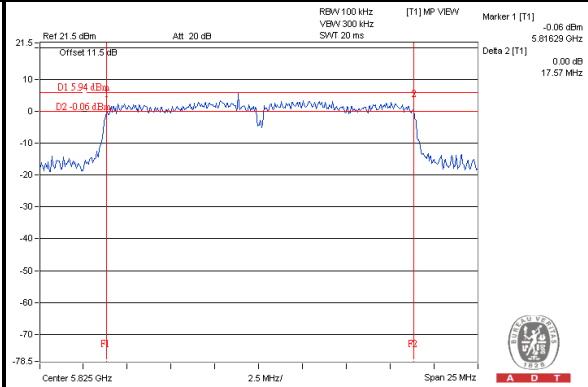
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SPECTRUM PLOT OF WORST VALUE

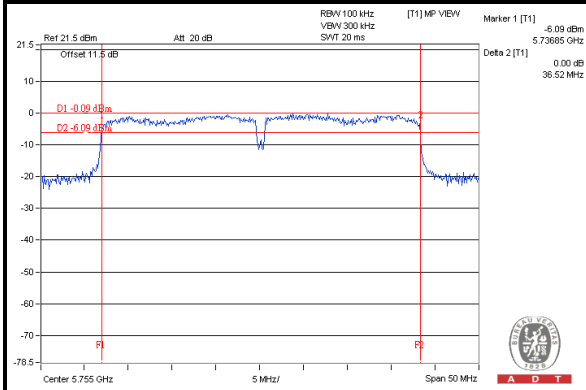
802.11a : CH165



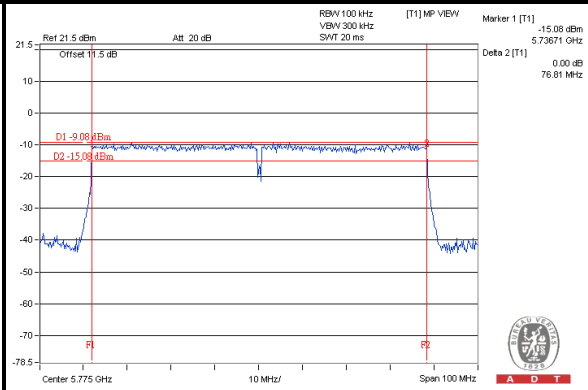
802.11ac (VHT20) / Chain(0) : CH165



802.11ac (VHT40) / Chain(0) : CH151



802.11ac (VHT80) / Chain(1) : CH155





5.4 CONDUCTED OUTPUT POWER MEASUREMENT

5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 5725 –5850 MHz band: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT \leq 4;

Array Gain = 0 dB (i.e., no array gain) for channel widths \geq 40 MHz for any NANT;

Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT \geq 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

5.4.2 INSTRUMENTS

[For 802.11a, 802.11ac\(VHT20\), 802.11ac\(VHT40\)](#)

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power meter Anritsu	ML2495A	0824006	May 20, 2013	May 19, 2014
Power sensor Anritsu	MA2411B	0738172	May 20, 2013	May 19, 2014

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Feb. 07, 2014

[For 802.11ac\(VHT80\)](#)

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100060	May 03, 2013	May 02, 2014

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Feb. 07, 2014

5.4.3 TEST PROCEDURES

For 802.11a, 802.11ac(VHT20), 802.11ac(VHT40)

The peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the peak power level.

For 802.11ac(VHT80)

Follow FCC KDB 558074 DTS test procedure:

Measurement Procedure Peak 2

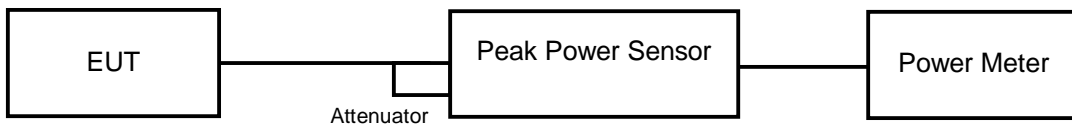
1. Set the RBW = 1 MHz.
2. Set the VBW \geq 3 RBW.
3. Set the span \geq 1.5 x DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the spectrum analyzer's integrated band power measurement function with band limits set equal to the DTS bandwidth edges.

5.4.4 DEVIATION FROM TEST STANDARD

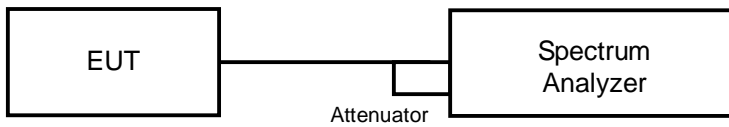
No deviation.

5.4.5 TEST SETUP

For 802.11a, 802.11ac(VHT20), 802.11ac(VHT40)



For 802.11ac(VHT80)



5.4.6 EUT OPERATING CONDITIONS

Same as Item 5.3.6



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5.4.7 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
149	5745	146.555	21.66	30	PASS
157	5785	141.579	21.51	30	PASS
165	5825	143.219	21.56	30	PASS

802.11ac(VHT20)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
149	5745	21.88	21.61	299.047	24.76	30	PASS
157	5785	21.71	21.44	287.568	24.59	30	PASS
165	5825	21.66	21.56	289.774	24.62	30	PASS

802.11ac(VHT40)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
151	5755	21.13	21.13	259.436	24.14	30	PASS
159	5795	21.29	21.02	261.060	24.17	30	PASS

802.11ac (VHT80)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
155	5775	17.62	19.56	148.175	21.71	30	PASS



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5.5 AVERAGE OUTPUT POWER

5.5.1 FOR REFERENCE.

5.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	1014008	Apr. 23, 2013	Apr. 22, 2014
Power Sensor	MA2411B	0917122	Apr. 23, 2013	Apr. 22, 2014

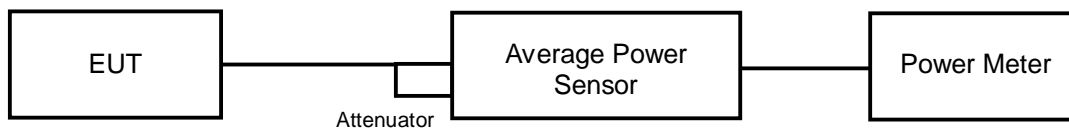
Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Feb. 07, 2014

5.5.3 TEST PROCEDURES

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

5.5.4 TEST SETUP



5.5.5 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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5.5.6 TEST RESULTS

802.11a

CHAN.	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
149	5745	37.239	15.71
157	5785	31.769	15.02
165	5825	34.119	15.33

802.11ac(VHT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
149	5745	16.27	15.05	74.353	18.71
157	5785	16.93	15.34	83.515	19.22
165	5825	16.44	15.17	76.940	18.86

802.11ac(VHT40)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
151	5755	16.84	14.23	74.791	18.74
159	5795	16.97	14.20	76.077	18.81

802.11ac (VHT80)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
155	5775	9.31	8.26	15.230	11.83

5.6 POWER SPECTRAL DENSITY MEASUREMENT

5.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2014	Jan. 20, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Feb. 07, 2014

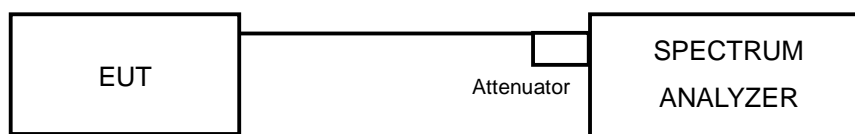
5.6.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW =10 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum amplitude level.

5.6.4 DEVIATION FROM TEST STANDARD

No deviation

5.6.5 TEST SETUP



5.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

5.6.7 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
149	5745	-10.84	8	PASS
157	5785	-10.78	8	PASS
165	5825	-10.27	8	PASS

802.11ac(VHT20)

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	149	5745	-10.09	3.01	-7.08	8	PASS
	157	5785	-7.01	3.01	-4.00	8	PASS
	165	5825	-8.29	3.01	-5.28	8	PASS
1	149	5745	-11.71	3.01	-8.70	8	PASS
	157	5785	-13.06	3.01	-10.05	8	PASS
	165	5825	-12.18	3.01	-9.17	8	PASS

802.11ac(VHT40)

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	151	5755	-11.10	3.01	-8.09	8	PASS
	159	5795	-11.30	3.01	-8.29	8	PASS
1	151	5755	-15.11	3.01	-12.10	8	PASS
	159	5795	-15.75	3.01	-12.74	8	PASS

802.11ac(VHT80)

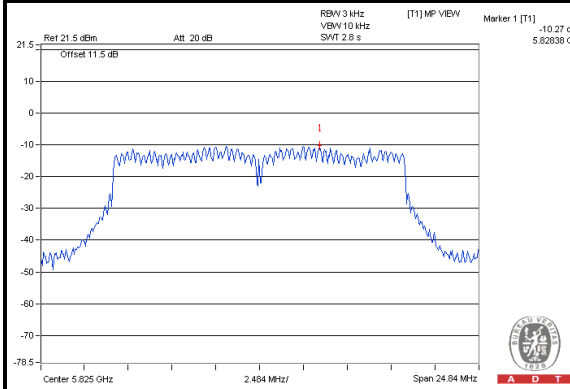
TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	155	5775	-22.44	3.01	-19.43	8	PASS
1	155	5775	-21.44	3.01	-18.43	8	PASS



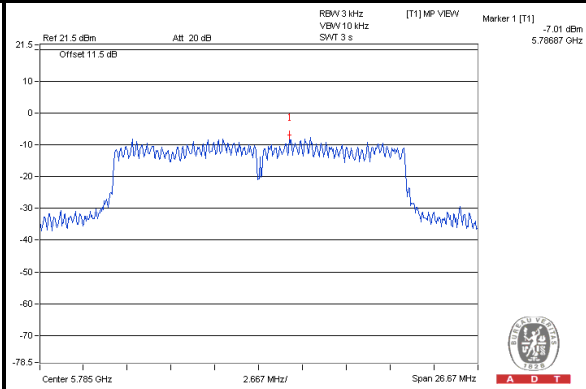
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SPECTRUM PLOT OF WORST VALUE

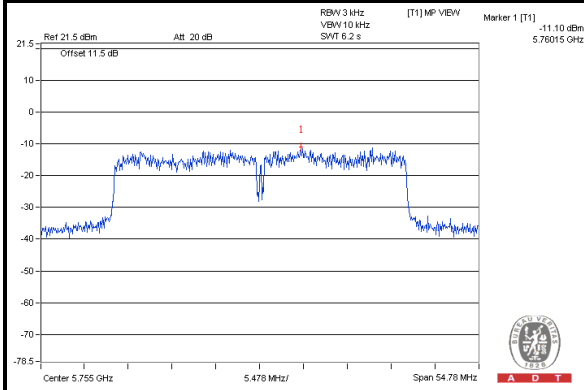
802.11a : CH165



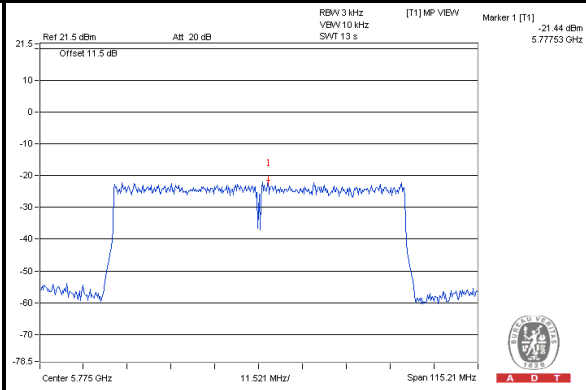
802.11ac (VHT20) / Chain(0) : CH157



802.11ac (VHT40) / Chain(0) : CH151



802.11ac (VHT80) / Chain(1) : CH155





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5.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

5.7.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

5.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2014	Jan. 20, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Feb. 07, 2014

5.7.3 TEST PROCEDURE

Measurement Procedure - Reference Level

1. Set the RBW = 100 kHz.
2. Set the VBW \geq 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

Measurement Procedure –Unwanted Emission Level

1. Set RBW = 100 kHz.
2. Set VBW \geq 300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

5.7.4 DEVIATION FROM TEST STANDARD

No deviation

5.7.5 TEST SETUP



5.7.6 EUT OPERATING CONDITION

Same as Item 4.3.6

5.7.7 TEST RESULTS

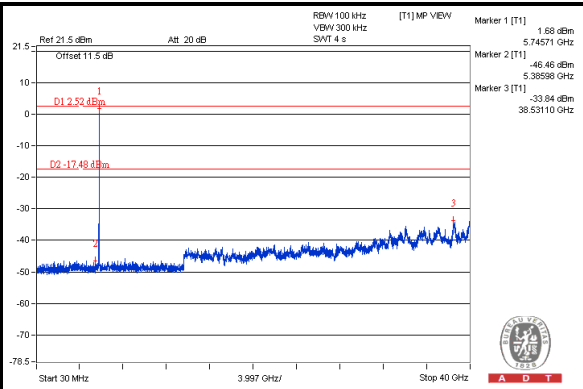
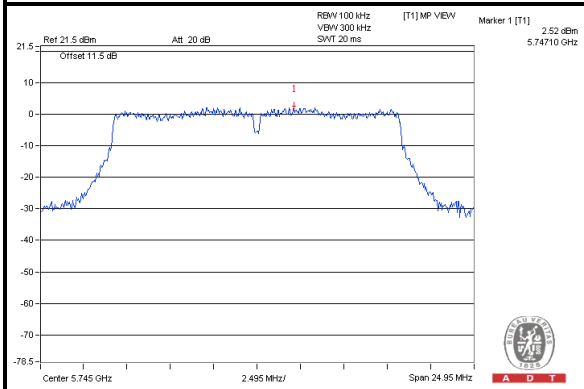
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



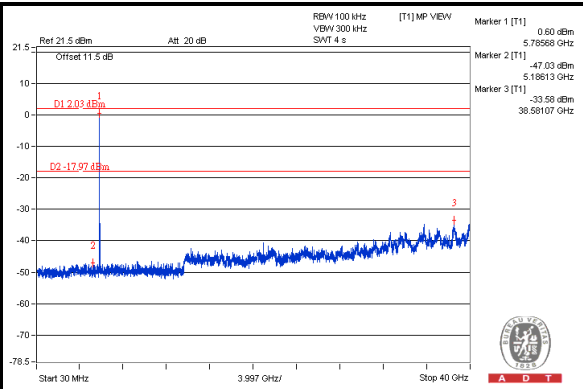
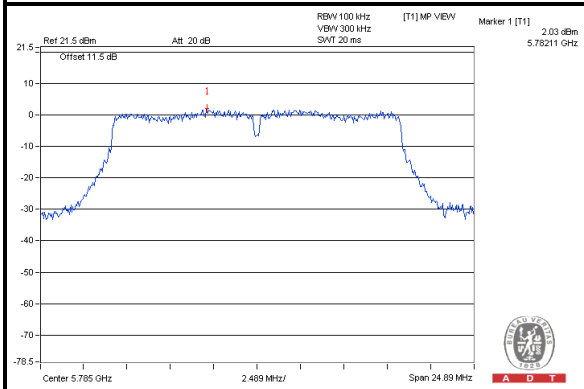
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802.11a

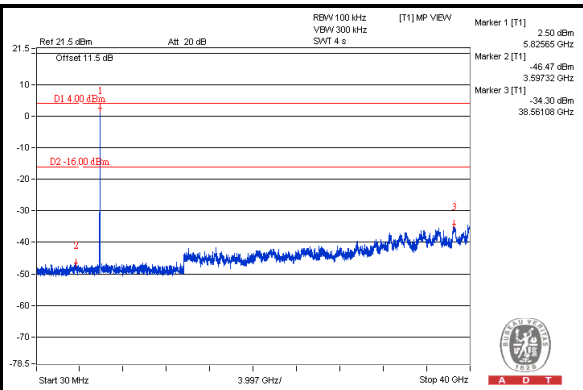
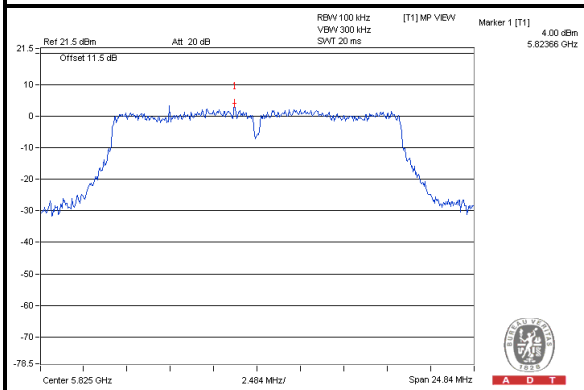
CH 149



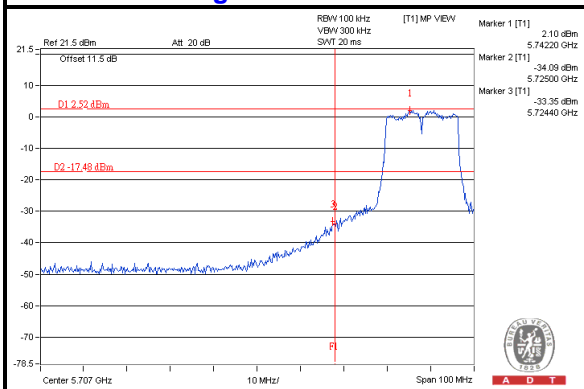
CH 157



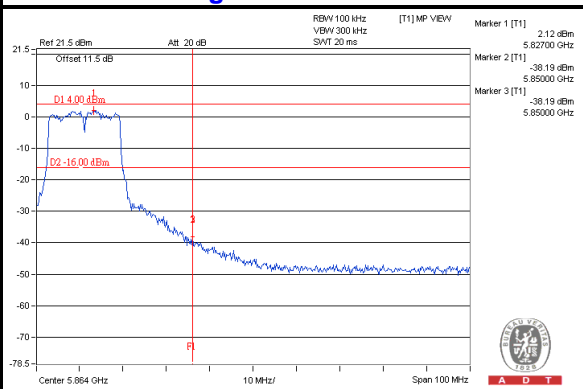
CH 165



CH 149 Band edge



CH 165 Band edge

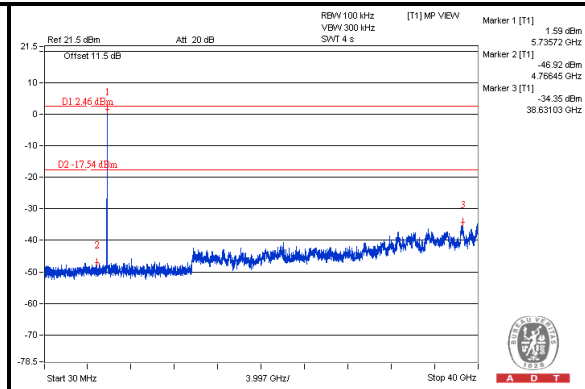
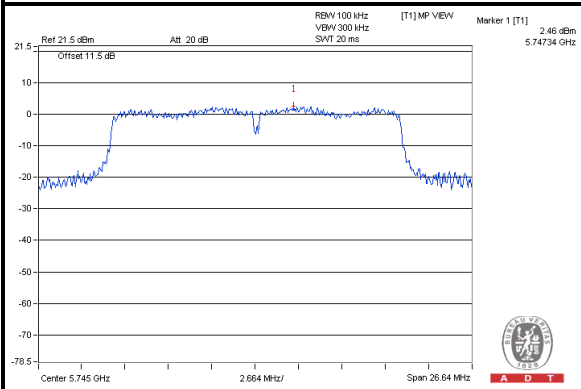




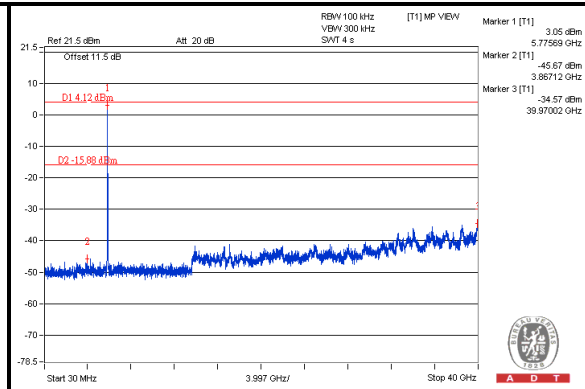
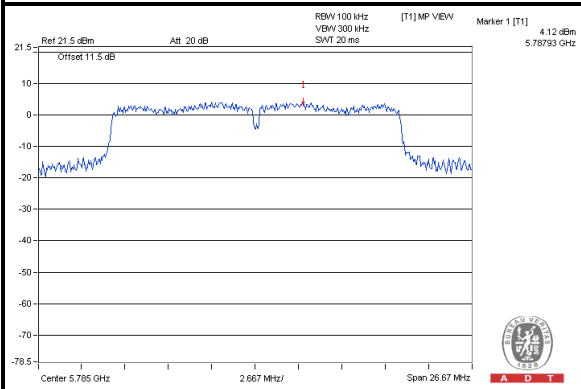
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For Chain (0): 802.11ac(VHT20)

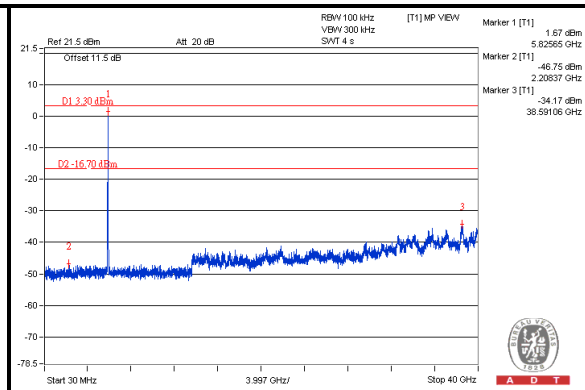
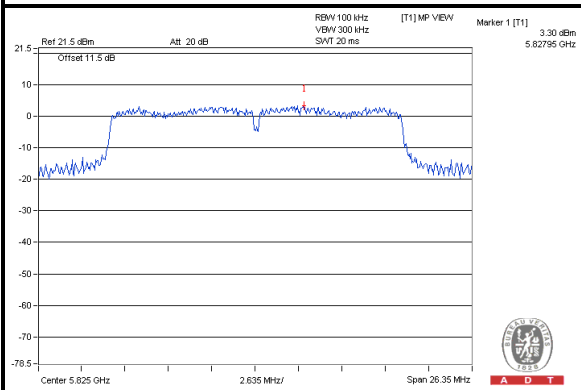
CH 149



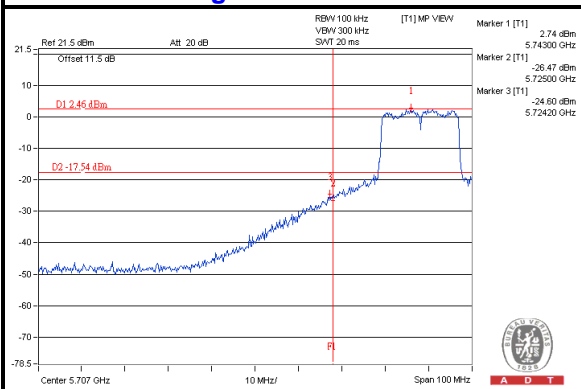
CH 157



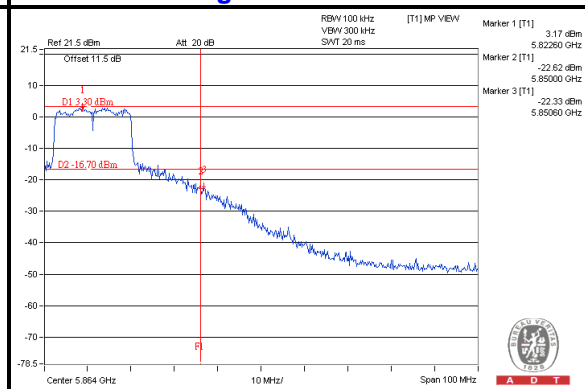
CH 165



CH 149 Band edge



CH 165 Band edge

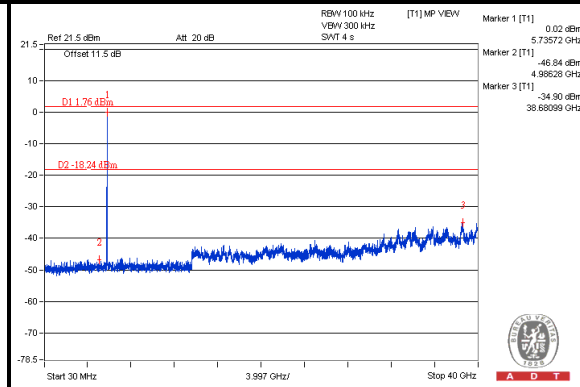
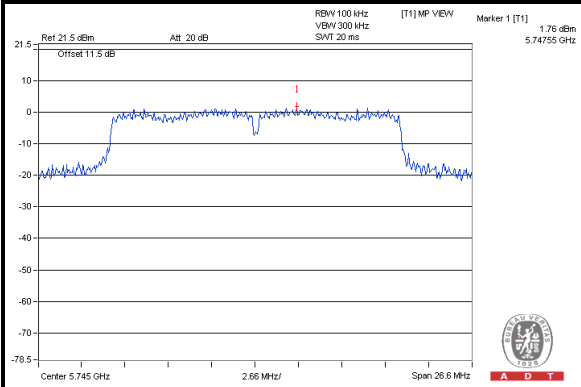




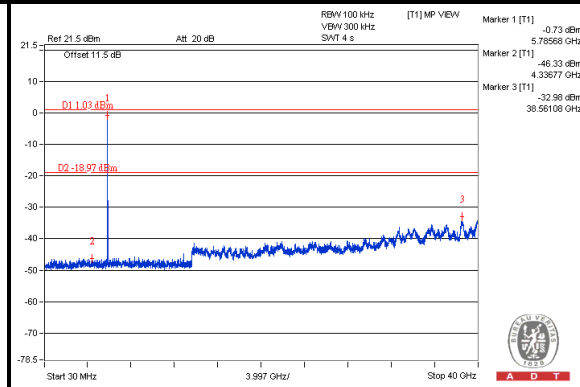
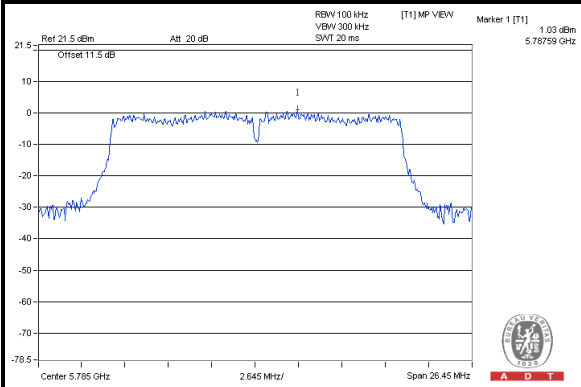
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For Chain (1): 802.11ac(VHT20)

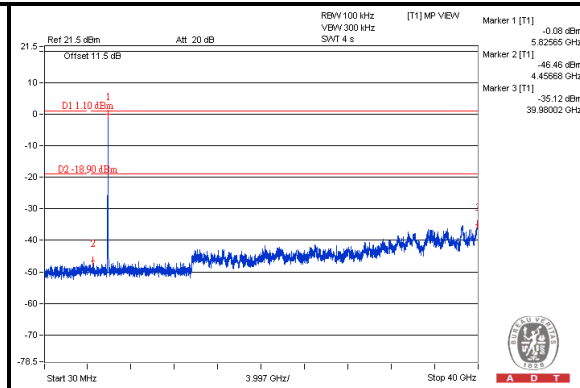
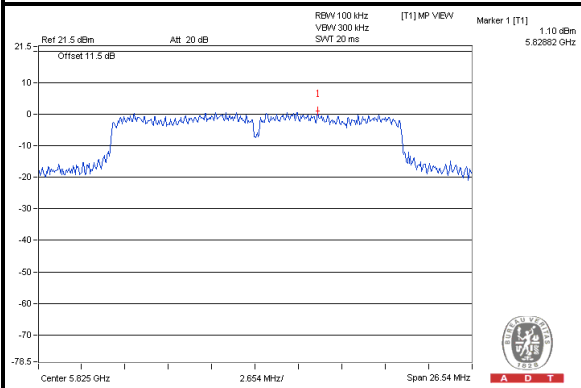
CH 149



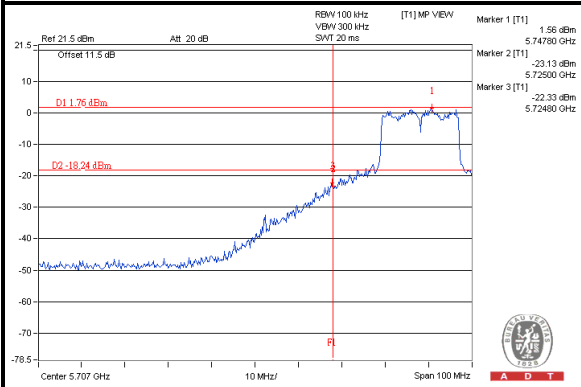
CH 157



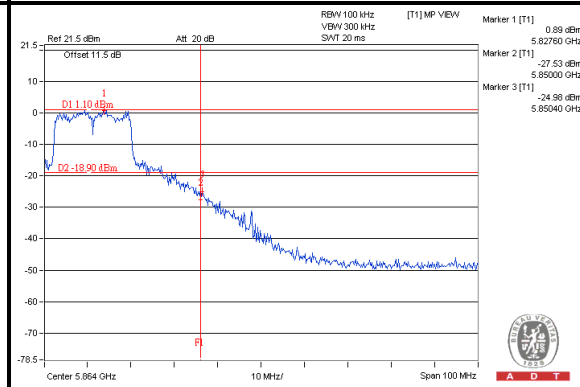
CH 165



CH 149 Band edge



CH 165 Band edge

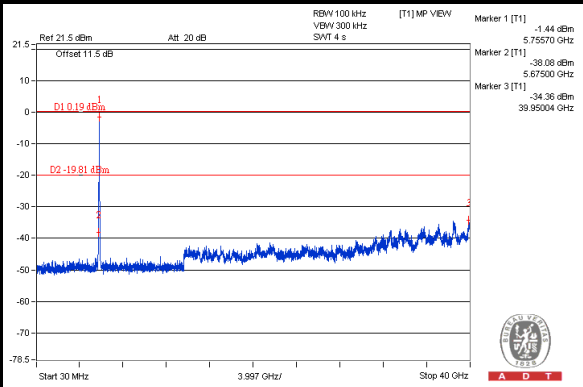
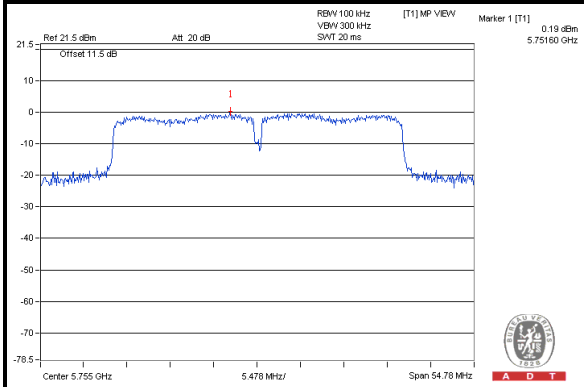




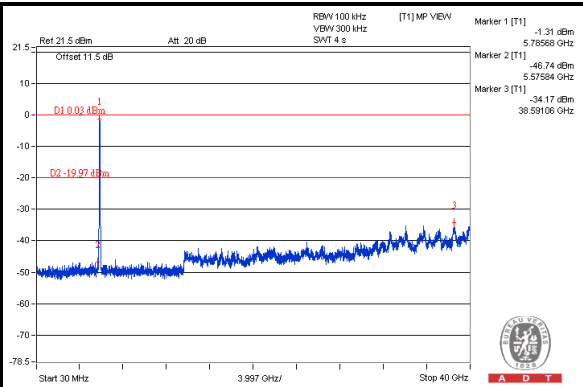
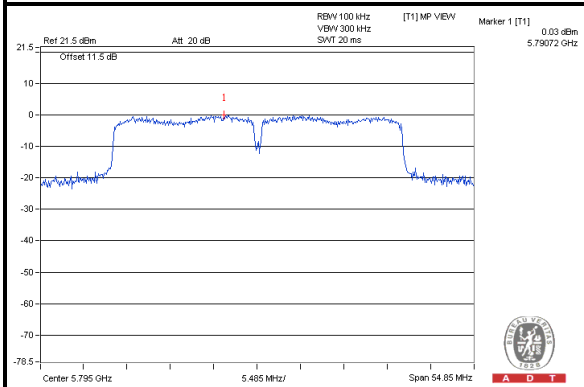
A D T

For Chain (0): 802.11ac(VHT40)

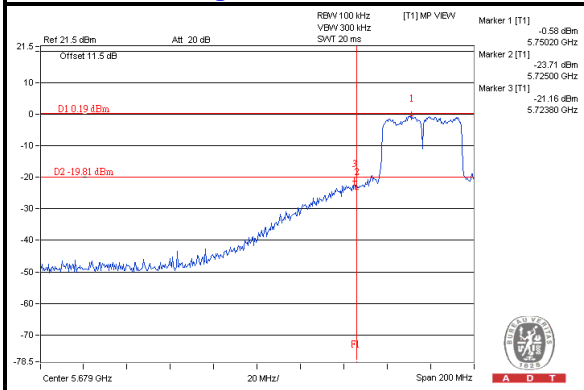
CH 151



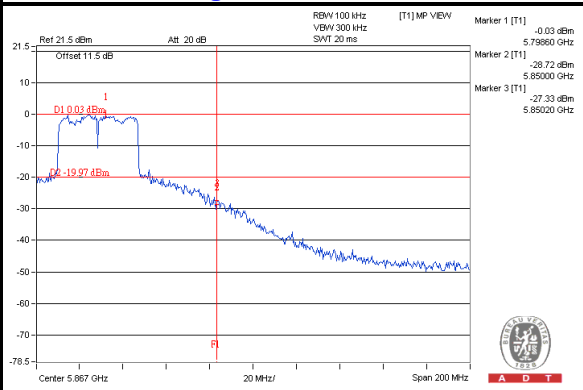
CH 159



CH 151 Band edge



CH 159 Band edge

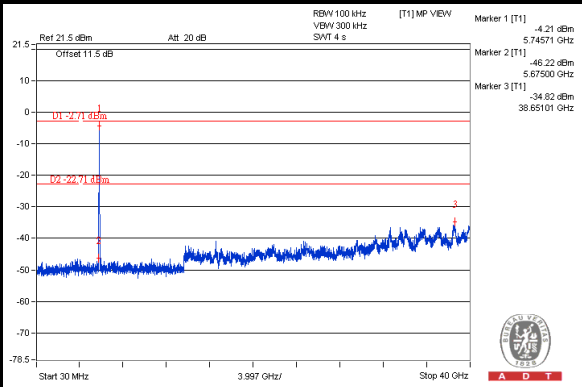
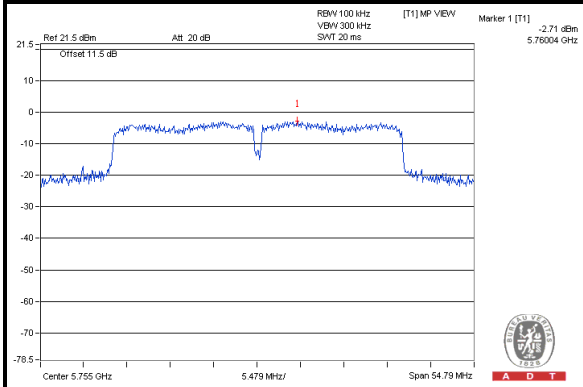




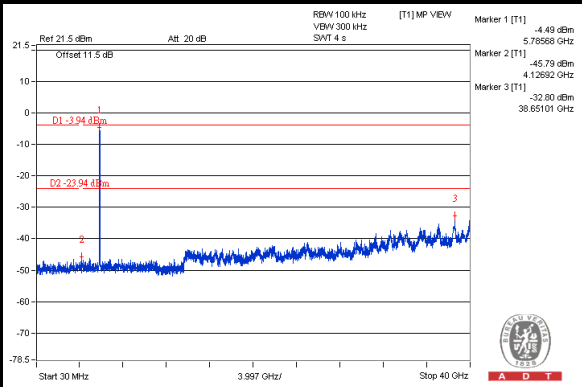
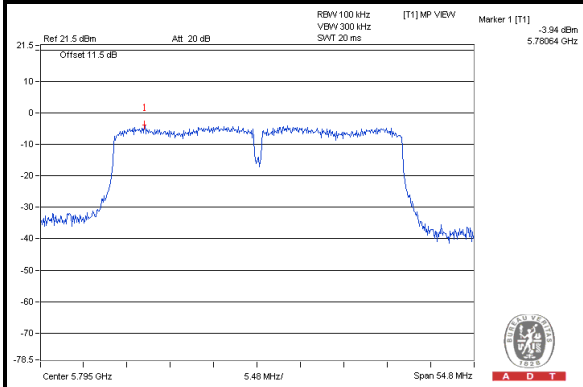
A D T

For Chain (1): 802.11ac(VHT40)

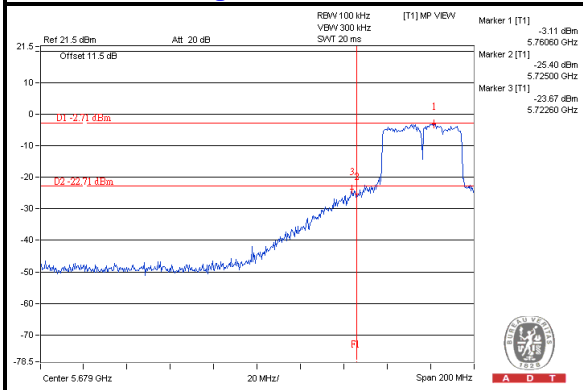
CH 151



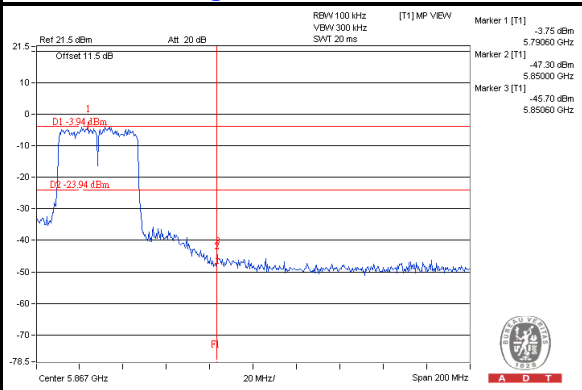
CH 159



CH 151 Band edge



CH 159 Band edge

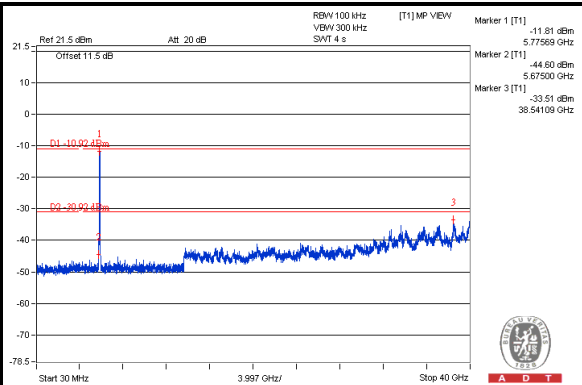
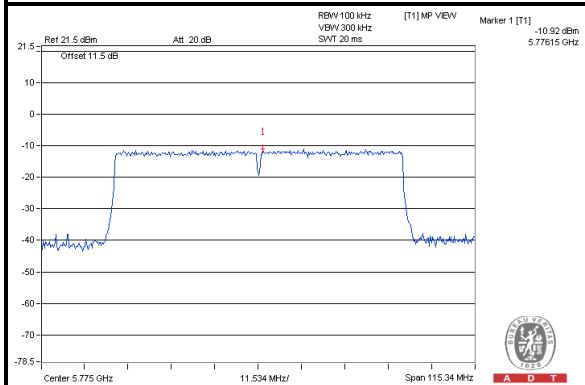




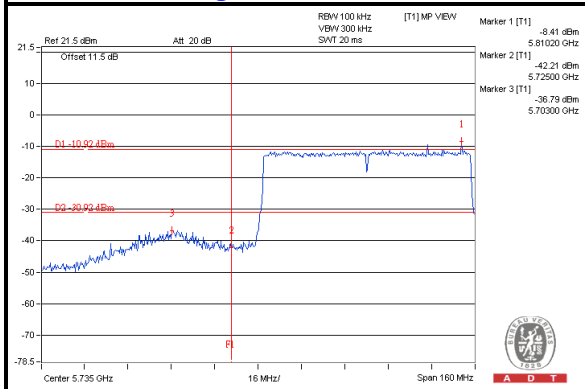
A D T

For Chain (0): 802.11ac(VHT80)

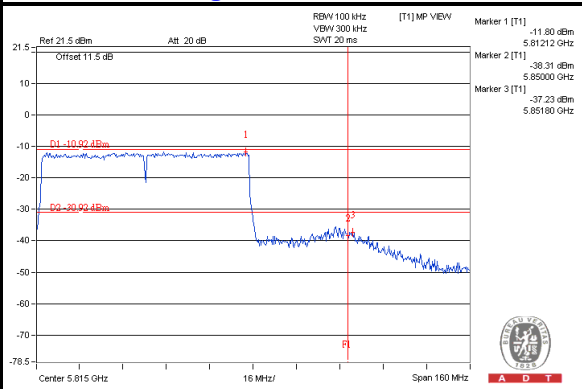
CH 155



CH 155 Band edge



CH 155 Band edge

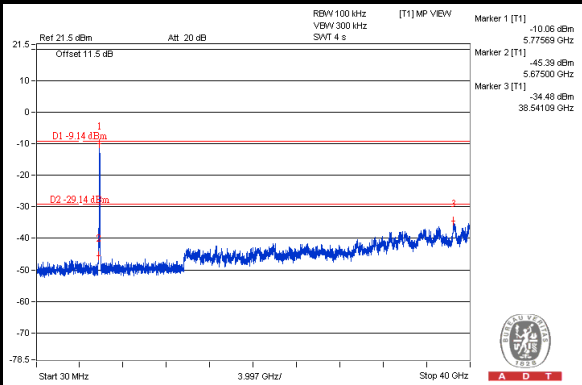
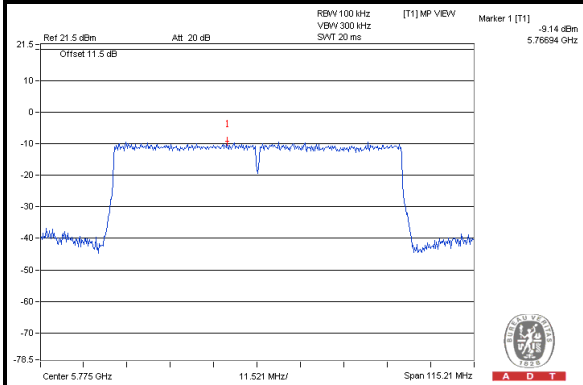




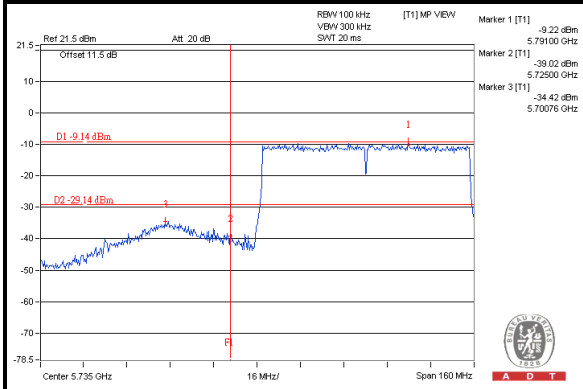
A D T

For Chain (1): 802.11ac(VHT80)

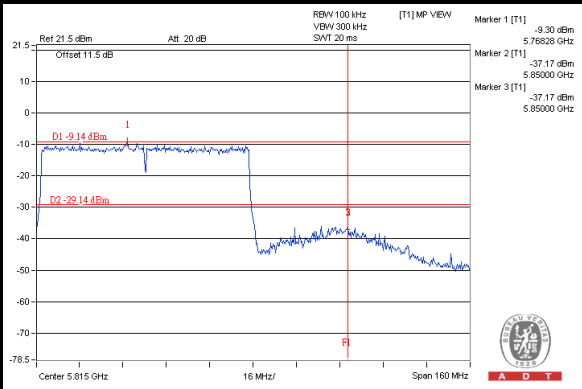
CH 155



CH 155 Band edge



CH 155 Band edge

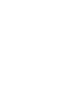




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6. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).





7. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.



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8. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

--- END ---