FCC TEST REPORT (15.247)

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MODEL NO.: Archer D9

FCC ID: TE7D9V1

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TESTED: Oct. 01 ~ Nov. 14, 2014

ISSUED: Nov. 14, 2014

APPLICANT: TP-LINK TECHNOLOGIES CO., LTD.

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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TEST LOCATION: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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TABLE OF CONTENTS

RELEASE CONTROL RECORD 5
1. CERTIFICATION 6
2. SUMMARY OF TEST RESULTS 7
2.1 MEASUREMENT UNCERTAINTY 7
3. GENERAL INFORMATION 8
3.1 GENERAL DESCRIPTION OF EUT 8
3.2 DESCRIPTION OF TEST MODES 10
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL 11
3.3 DUTY CYCLE OF TEST SIGNAL 15
3.4 DESCRIPTION OF SUPPORT UNITS 17
3.4.1 CONFIGURATION OF SYSTEM UNDER TEST 18
3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS 19
4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND) 20
4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT 20
4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT 20
4.1.2 TEST INSTRUMENTS 21
4.1.3 TEST PROCEDURES 22
4.1.4 DEVIATION FROM TEST STANDARD 22
4.1.5 TEST SETUP 23
4.1.6 EUT OPERATING CONDITIONS 24
4.1.7 TEST RESULTS 25
4.2 CONDUCTED EMISSION MEASUREMENT 38
4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT 38
4.2.2 TEST INSTRUMENTS 38
4.2.3 TEST PROCEDURES 39
4.2.4 DEVIATION FROM TEST STANDARD 39
4.2.5 TEST SETUP 39
4.2.6 EUT OPERATING CONDITIONS 39
4.2.7 TEST RESULTS 40
4.3 6dB BANDWIDTH MEASUREMENT 42
4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT 42
4.3.2 TEST SETUP 42
4.3.3 TEST INSTRUMENTS 42
4.3.4 TEST PROCEDURE 42
4.3.5 DEVIATION FROM TEST STANDARD 42
4.3.6 EUT OPERATING CONDITIONS 42
4.3.7 TEST RESULTS 43
4.4 CONDUCTED OUTPUT POWER 45
4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT 45

4.4.2 TEST SETUP 45
4.4.3 TEST INSTRUMENTS 45
4.4.4 TEST PROCEDURES 45
4.4.5 DEVIATION FROM TEST STANDARD 46
4.4.6 EUT OPERATING CONDITIONS 46
4.4.7 TEST RESULTS 47
4.5 POWER SPECTRAL DENSITY MEASUREMENT 48
4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT 48
4.5.2 TEST SETUP 48
4.5.3 TEST INSTRUMENTS 48
4.5.4 TEST PROCEDURE 48
4.5.5 DEVIATION FROM TEST STANDARD 49
4.5.6 EUT OPERATING CONDITION 49
4.5.7 TEST RESULTS 50
4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT 53
4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT 53
4.6.2 TEST SETUP 53
4.6.3 TEST INSTRUMENTS 53
4.6.4 TEST PROCEDURE 54
4.6.5 DEVIATION FROM TEST STANDARD 54
4.6.6 EUT OPERATING CONDITION 54
4.6.7 TEST RESULTS 54
5. TEST TYPES AND RESULTS (FOR 5.0GHz BAND) 67
5.1 RADIATED EMISSION MEASUREMENT 67
5.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT 67
5.1.2 TEST INSTRUMENTS 68
5.1.3 TEST PROCEDURES 68
5.1.4 DEVIATION FROM TEST STANDARD 68
5.1.5 TEST SETUP 68
5.1.6 EUT OPERATING CONDITIONS 68
5.1.7 TEST RESULTS 69
5.2 CONDUCTED EMISSION MEASUREMENT 79
5.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT 79
5.2.2 TEST INSTRUMENTS 79
5.2.3 TEST PROCEDURES 79
5.2.4 DEVIATION FROM TEST STANDARD 79
5.2.5 TEST SETUP 79
5.2.6 EUT OPERATING CONDITIONS 79
5.2.7 TEST RESULTS 80
5.3 6dB BANDWIDTH MEASUREMENT 82
5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT 82
5.3.2 TEST SETUP 82

5.3.3 TEST INSTRUMENTS 82
5.3.4 TEST PROCEDURE 82
5.3.5 DEVIATION FROM TEST STANDARD 82
5.3.6 EUT OPERATING CONDITIONS 82
5.3.7 TEST RESULTS 83
5.4 CONDUCTED OUTPUT POWER 85
5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT 85
5.4.2 TEST SETUP 85
5.4.3 INSTRUMENTS 85
5.4.4 TEST PROCEDURES 86
5.4.5 DEVIATION FROM TEST STANDARD 86
5.4.6 EUT OPERATING CONDITIONS 86
5.4.7 TEST RESULTS 87
5.5 POWER SPECTRAL DENSITY MEASUREMENT 88
5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT 88
5.5.2 TEST SETUP 88
5.5.3 TEST INSTRUMENTS 88
5.5.4 TEST PROCEDURE. 88
5.5.5 DEVIATION FROM TEST STANDARD 88
5.5.6 EUT OPERATING CONDITION 88
5.5.7 TEST RESULTS 89
5.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT 92
5.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT 92
5.6.2 TEST SETUP 92
5.6.3 TEST INSTRUMENTS 92
5.6.4 TEST PROCEDURE 92
5.6.5 DEVIATION FROM TEST STANDARD 92
5.6.6 EUT OPERATING CONDITION 92
5.6.7 TEST RESULTS 92
6. PHOTOGRAPHS OF THE TEST CONFIGURATION 105
7. INFORMATION ON THE TESTING LABORATORIES 106
8. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB 107

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140624C38	Original release.	Nov. 14, 2014

1. CERTIFICATION

PRODUCT:	AC1900 Wireless Dual Band Gigabit ADSL2+ Modem Router
MODEL NO.:	Archer D9
BRAND:	TP-LINK
APPLICANT:	TP-LINK TECHNOLOGIES CO., LTD.
TESTED:	Oct. 01 ~ Nov. 14, 2014
TEST SAMPLE:	Prototype
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)**
	ANSI C63.10-2009

The above equipment (model: Archer D9) 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 : _____ **, DATE :** Nov. 14, 2014
Suntee Liu / Specialist

APPROVED BY : _____ **, DATE :** Nov. 14, 2014
Ken Liu / Senior Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

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 -6.50dB at 0.16054MHz.
15.205 & 209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.4dB at 2382.00 MHz & 2491.00MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -3.9dB at 2483.50MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted 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 RP-SMA-M not a standard connector.

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:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.59 dB
	200MHz ~1000MHz	3.60 dB
	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	AC1900 Wireless Dual Band Gigabit ADSL2+ Modem Router
MODEL NO.	Archer D9
POWER SUPPLY	12Vdc (Adapter)
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b:11/5.5/2/1Mbps 802.11a/g: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 450Mbps 802.11ac: up to 1300Mbps
OPERATING FREQUENCY	**2.4GHz:** 2412 ~ 2462MHz **5.0GHz:** 5745 ~ 5825MHz
NUMBER OF CHANNEL	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7 **5.0GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 5 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1
OUTPUT POWER	**2.4GHz:** 748.086mW **5.0GHz:** 558.884mW
ANTENNA TYPE	**2.4GHz:** Omni directional antenna with 2.1dBi gain **5.0GHz:** Omni directional antenna with 1.5dBi gain
ANTENNA CONNECTOR	RP-SMA-M
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

NOTE:

1. The EUT incorporates a MIMO function. The EUT provides 3 completed transmitters and 3 receivers.

MODULATION MODE	TX FUNCTION
802.11b	3TX
802.11g	3TX
802.11a	3TX
802.11n (HT20)	3TX
802.11n (HT40)	3TX
802.11ac (VHT20)	3TX
802.11ac (VHT40)	3TX
802.11ac (VHT80)	3TX

*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)

2. The EUT consumes power from following adapter.

Brand	Ten Pao International Inc.
Model	S048CU1200330
Input Power	100-240Vac, 50/60Hz, 1.5A Max
Output Power	12.0Vdc, 3300mA
Power Line	1.5m cable without core attached on adapter

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 DESCRIPTION OF TEST MODES

FOR 2.4GHz:

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		

FOR 5.0GHz (5745 ~ 5825MHz):

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

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

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

CHANNEL	FREQUENCY
155	5775MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

FOR 2.4GHz:

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

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

RADIATED EMISSION TEST (ABOVE 1GHz):

☒ 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

RADIATED EMISSION TEST (BELOW 1GHz):

☒ 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	6	DSSS	DBPSK	1.0

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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	6	DSSS	DBPSK	1.0

BANDEDGE 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 11	OFDM	BPSK	7.2
-	802.11n (HT40)	3 to 9	3, 9	OFDM	BPSK	15.0

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	21 deg. C, 70% RH	120Vac, 60Hz	Nick Hsu
RE<1G	21 deg. C, 70% RH	120Vac, 60Hz	Nick Hsu
PLC	25 deg. C, 65% RH	120Vac, 60Hz	Chris Lin
APCM	24 deg. C, 64% RH	120Vac, 60Hz	Match Tsui

FOR 5.0GHz (5745 ~ 5825MHz):

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

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

RADIATED EMISSION TEST (ABOVE 1GHz):

☒ 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	15.0
-	802.11ac (VHT80)	155	155	OFDM	BPSK	87.8

RADIATED EMISSION TEST (BELOW 1GHz):

☒ 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149	OFDM	BPSK	6.0

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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149	OFDM	BPSK	6.0

BANDEDGE 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149, 165	OFDM	BPSK	6.0
-	802.11n (HT20)	149 to 165	149, 165	OFDM	BPSK	7.2
-	802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	15.0
-	802.11ac (VHT80)	155	155	OFDM	BPSK	87.8

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	15.0
-	802.11ac (VHT80)	155	155	OFDM	BPSK	87.8

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	21 deg. C, 70% RH	120Vac, 60Hz	Nick Hsu
RE<1G	21 deg. C, 70% RH	120Vac, 60Hz	Nick Hsu
PLC	25 deg. C, 65% RH	120Vac, 60Hz	Chris Lin
APCM	24 deg. C, 64% RH	120Vac, 60Hz	Match Tsui

3.3 DUTY CYCLE OF TEST SIGNAL

If duty cycle is < 98%, duty factor shall be considered.

For 2.4GHz Band:

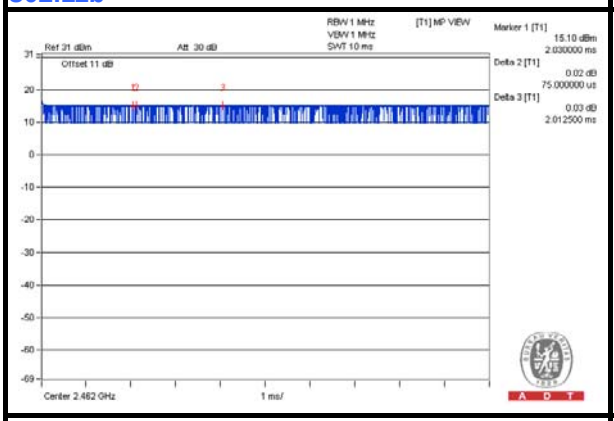
802.11b: Duty cycle of test signal is > 98 %

802.11g: Duty cycle = 2.052/2.085 = 0.984 > 98 %

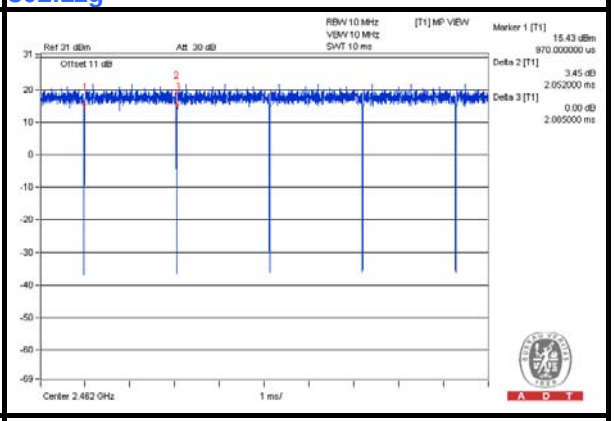
802.11n (HT20): Duty cycle = 1.909/1.949 = 0.979, Duty factor = 10 * log(1/0.979) = 0.09

802.11n (HT40): Duty cycle = 0.938/0.963 = 0.974, Duty factor = 10 * log(1/0.974) = 0.11

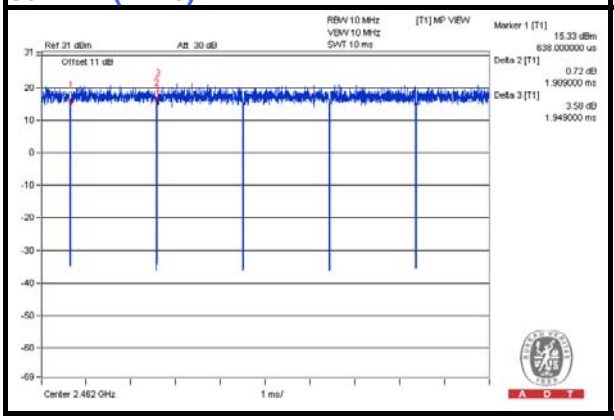
802.11b



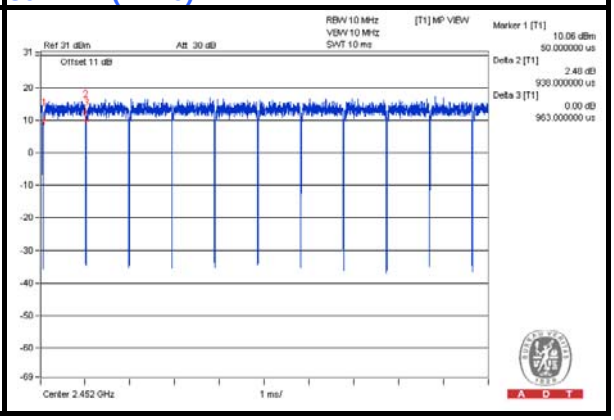
802.11g



802.11n (HT20)



802.11n (HT40)



For 5GHz Band:

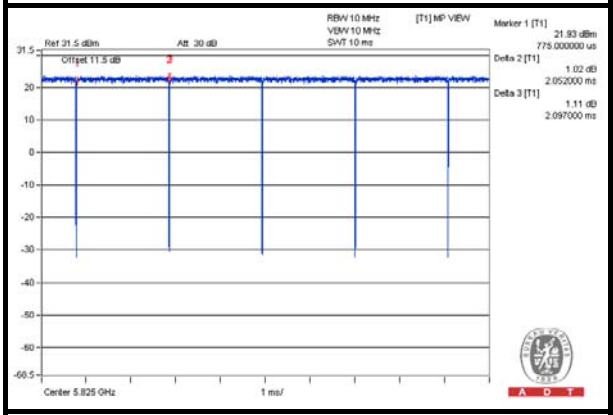
802.11a: Duty cycle = 2.052/2.097 = 0.979, Duty factor = 10 * log(1/0.979) = 0.09

802.11n (HT20): Duty cycle = 1.909/1.949 = 0.979, Duty factor = 10 * log(1/0.979) = 0.09

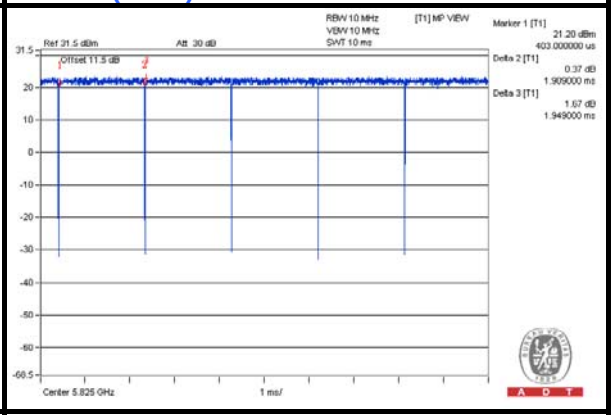
802.11n (HT40): Duty cycle = 0.940/0.968 = 0.971, Duty factor = 10 * log(1/0.971) = 0.13

802.11ac (VHT80): Duty cycle = 0.440/0.478 = 0.921, Duty factor = 10 * log(1/0.921) = 0.36

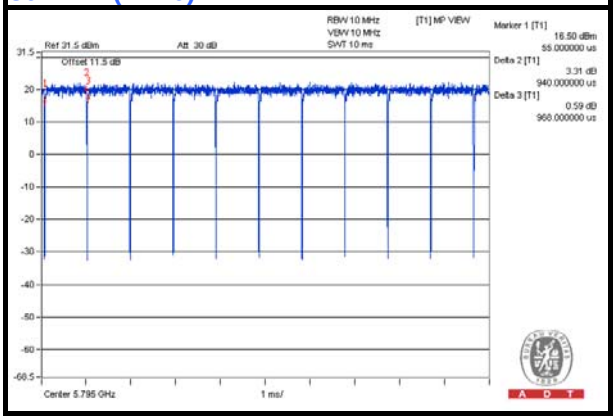
802.11a



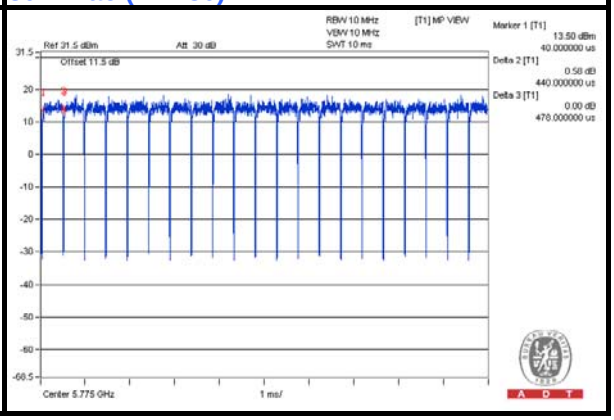
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)



3.4 DESCRIPTION OF SUPPORT UNITS

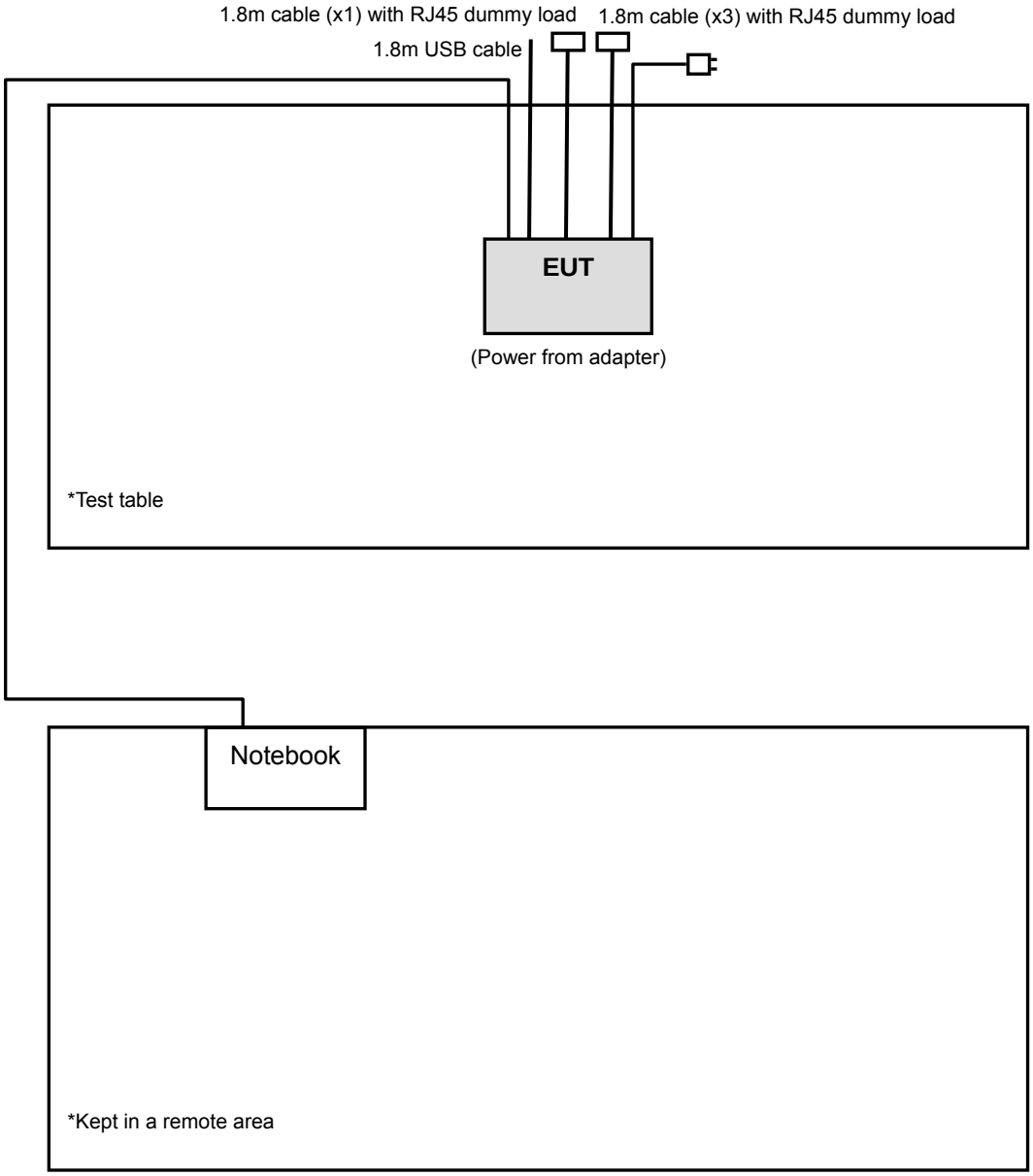
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	3m RJ45 UTP cable

NOTE:
1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1 acted as a communication partner to transfer data.

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST



3.5 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 v03r02
662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2009

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

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND)

4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE 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 30dB 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 30dB under any condition of modulation.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 07, 2013	Oct. 06, 2014
			Oct. 06, 2014	Oct. 05, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSU 43	100115	Dec. 18, 2013	Dec. 17, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Feb. 26, 2014	Feb. 25, 2015
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Jan. 05, 2014	Jan. 04, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 17, 2014	Feb. 16, 2015
Loop Antenna	HFH2-Z2	100070	Mar. 06, 2014	Mar. 05, 2016
Preamplifier Agilent	8449B	3008A01961	Oct. 28, 2013	Oct. 27, 2014
			Oct. 18, 2014	Oct. 17, 2015
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2013	Oct. 17, 2014
			Oct. 18, 2014	Oct. 17, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250724/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Aug. 09, 2014	Aug. 08, 2015
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table BV ADT	TT100.	TT93021704	NA	NA
Turn Table Controller BV ADT	SC100.	SC93021704	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2013	Oct. 17, 2014
			Oct. 18, 2014	Oct. 17, 2015
High Speed Peak Power Meter	ML2495A	0824011	Jul. 26, 2014	Jul. 25, 2015
Power Sensor	MA2411B	0738171	Jul. 26, 2014	Jul. 25, 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. The test was performed in HwaYa Chamber 4.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 460141.

5. The IC Site Registration No. is IC7450F-4.

4.1.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. 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 antenna is a broadband antenna, and its height 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

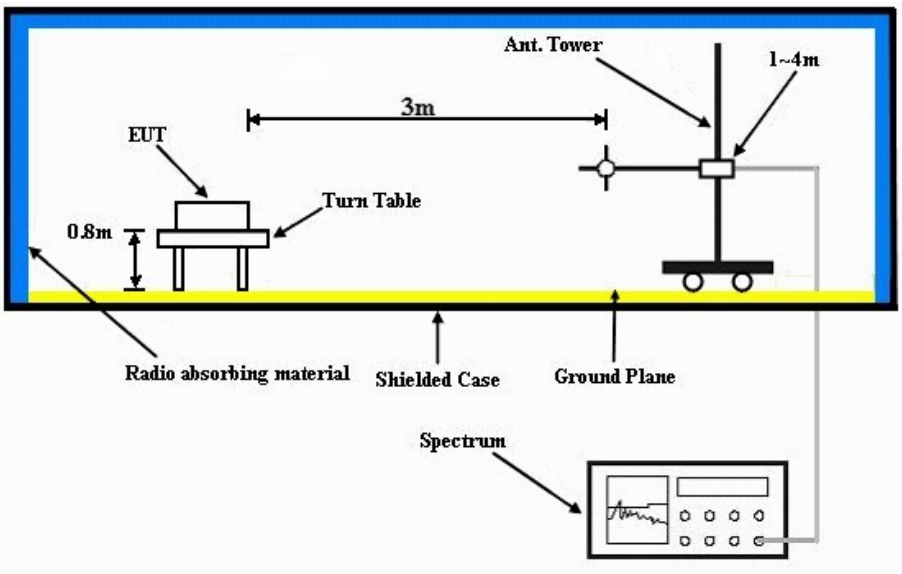
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

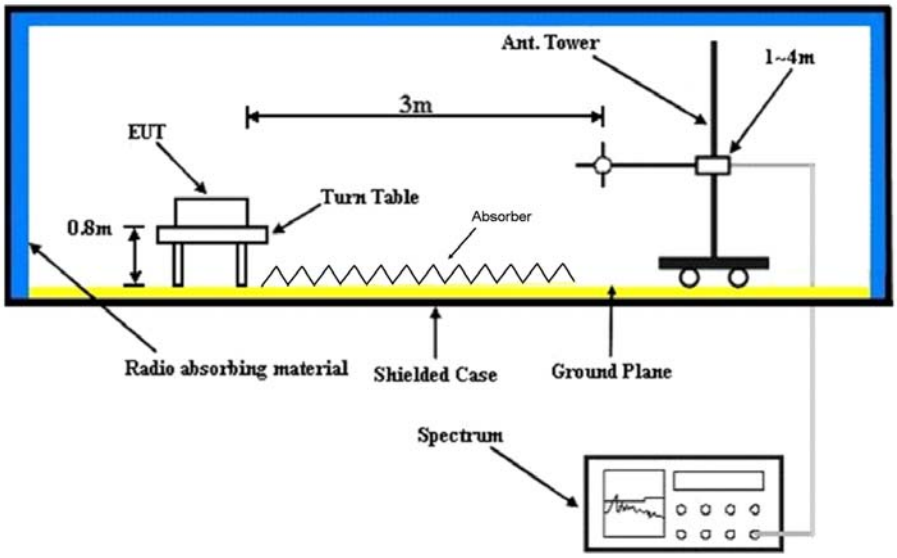
No deviation.

4.1.5 TEST SETUP

Frequency range 30MHz~1GHz



Frequency range above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT OPERATING CONDITIONS

a. Placed the EUT on the testing table.
b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
d. The communication partners sent data to EUT by command "PING".
e. The necessary accessories enabled the system in full functions.

4.1.7 TEST RESULTS

ABOVE 1GHz DATA：

802.11b

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

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	56.0 PK	74.0	-18.0	1.06 H	236	22.80	33.20
2	2390.00	45.0 AV	54.0	-9.0	1.06 H	236	11.80	33.20
3	*2412.00	107.1 PK			1.41 H	210	73.80	33.30
4	*2412.00	103.2 AV			1.41 H	210	69.90	33.30
5	2491.00	57.5 PK	74.0	-16.5	1.10 H	209	24.10	33.40
6	2491.00	46.4 AV	54.0	-7.6	1.10 H	209	13.00	33.40
7	4824.00	45.2 PK	74.0	-28.8	1.04 H	118	39.10	6.10
8	4824.00	32.9 AV	54.0	-21.1	1.04 H	118	26.80	6.10
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	58.6 PK	74.0	-15.4	1.00 V	147	25.40	33.20
2	2390.00	48.4 AV	54.0	-5.6	1.00 V	147	15.20	33.20
3	*2412.00	116.3 PK			1.18 V	121	83.00	33.30
4	*2412.00	112.4 AV			1.18 V	121	79.10	33.30
5	2491.00	62.5 PK	74.0	-11.5	1.00 V	132	29.10	33.40
6	**2491.00**	**53.6 AV**	**54.0**	**-0.4**	**1.00 V**	**132**	**20.20**	**33.40**
7	4824.00	45.5 PK	74.0	-28.5	1.06 V	152	39.40	6.10
8	4824.00	32.6 AV	54.0	-21.4	1.06 V	152	26.50	6.10

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.

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	110.7 PK			1.00 H	212	77.30	33.40
2	*2437.00	107.5 AV			1.00 H	212	74.10	33.40
3	4874.00	45.6 PK	74.0	-28.4	1.09 H	334	39.40	6.20
4	4874.00	33.3 AV	54.0	-20.7	1.09 H	334	27.10	6.20
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	122.2 PK			1.00 V	128	88.80	33.40
2	*2437.00	118.6 AV			1.00 V	128	85.20	33.40
3	4874.00	46.9 PK	74.0	-27.1	1.00 V	336	40.70	6.20
4	4874.00	35.9 AV	54.0	-18.1	1.00 V	336	29.70	6.20

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.

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	2382.00	57.2 PK	74.0	-16.8	1.00 H	214	24.00	33.20
2	2382.00	47.3 AV	54.0	-6.7	1.00 H	214	14.10	33.20
3	*2462.00	107.6 PK			1.41 H	214	74.30	33.30
4	*2462.00	103.7 AV			1.41 H	214	70.40	33.30
5	2483.50	56.6 PK	74.0	-17.4	1.17 H	198	23.20	33.40
6	2483.50	45.2 AV	54.0	-8.8	1.17 H	198	11.80	33.40
7	4924.00	46.1 PK	74.0	-27.9	1.10 H	94	39.80	6.30
8	4924.00	33.5 AV	54.0	-20.5	1.10 H	94	27.20	6.30
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	2382.00	61.5 PK	74.0	-12.5	1.00 V	126	28.30	33.20
2	**2382.00**	**53.6 AV**	**54.0**	**-0.4**	**1.00 V**	**126**	**20.40**	**33.20**
3	*2462.00	116.4 PK			1.00 V	124	83.10	33.30
4	*2462.00	112.7 AV			1.00 V	124	79.40	33.30
5	2483.50	58.9 PK	74.0	-15.1	1.00 V	135	25.50	33.40
6	2483.50	48.1 AV	54.0	-5.9	1.00 V	135	14.70	33.40
7	4924.00	46.5 PK	74.0	-27.5	1.09 V	48	40.20	6.30
8	4924.00	33.5 AV	54.0	-20.5	1.09 V	48	27.20	6.30

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.

802.11g

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

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	56.3 PK	74.0	-17.7	1.21 H	296	23.10	33.20
2	2390.00	45.2 AV	54.0	-8.8	1.21 H	296	12.00	33.20
3	*2412.00	103.2 PK			1.00 H	150	69.90	33.30
4	*2412.00	93.7 AV			1.00 H	150	60.40	33.30
5	4824.00	45.6 PK	74.0	-28.4	1.02 H	270	39.50	6.10
6	4824.00	32.7 AV	54.0	-21.3	1.02 H	270	26.60	6.10
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	1.00 V	150	30.10	33.20
2	2390.00	50.8 AV	54.0	-3.2	1.00 V	150	17.60	33.20
3	*2412.00	115.9 PK			1.00 V	167	82.60	33.30
4	*2412.00	105.6 AV			1.00 V	167	72.30	33.30
5	4824.00	45.9 PK	74.0	-28.1	1.03 V	84	39.80	6.10
6	4824.00	32.8 AV	54.0	-21.2	1.03 V	84	26.70	6.10

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.

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	112.9 PK			1.00 H	154	79.50	33.40
2	*2437.00	103.1 AV			1.00 H	154	69.70	33.40
3	4874.00	45.9 PK	74.0	-28.1	1.03 H	87	39.70	6.20
4	4874.00	33.2 AV	54.0	-20.8	1.03 H	87	27.00	6.20
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	123.8 PK			1.00 V	154	90.40	33.40
2	*2437.00	114.2 AV			1.00 V	154	80.80	33.40
3	4874.00	45.6 PK	74.0	-28.4	1.07 V	76	39.40	6.20
4	4874.00	33.0 AV	54.0	-21.0	1.07 V	76	26.80	6.20

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.

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	101.6 PK			1.00 H	183	68.30	33.30
2	*2462.00	92.1 AV			1.00 H	183	58.80	33.30
3	2483.50	56.5 PK	74.0	-17.5	1.10 H	52	23.10	33.40
4	2483.50	44.9 AV	54.0	-9.1	1.10 H	52	11.50	33.40
5	4924.00	47.0 PK	74.0	-27.0	1.03 H	100	40.70	6.30
6	4924.00	33.4 AV	54.0	-20.6	1.03 H	100	27.10	6.30
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	114.1 PK			1.00 V	165	80.80	33.30
2	*2462.00	103.9 AV			1.00 V	165	70.60	33.30
3	2483.50	60.7 PK	74.0	-13.3	1.00 V	334	27.30	33.40
4	2483.50	47.6 AV	54.0	-6.4	1.00 V	334	14.20	33.40
5	4924.00	46.0 PK	74.0	-28.0	1.06 V	233	39.70	6.30
6	4924.00	33.2 AV	54.0	-20.8	1.06 V	233	26.90	6.30

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.

802.11n (HT20)

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

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	56.3 PK	74.0	-17.7	1.00 H	166	23.10	33.20
2	2390.00	45.3 AV	54.0	-8.7	1.00 H	166	12.10	33.20
3	*2412.00	101.7 PK			1.00 H	215	68.40	33.30
4	*2412.00	92.0 AV			1.00 H	215	58.70	33.30
5	4824.00	45.3 PK	74.0	-28.7	1.00 H	98	39.20	6.10
6	4824.00	32.8 AV	54.0	-21.2	1.00 H	98	26.70	6.10
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	68.3 PK	74.0	-5.7	1.00 V	186	35.10	33.20
2	2390.00	51.7 AV	54.0	-2.3	1.00 V	186	18.50	33.20
3	*2412.00	114.2 PK			1.00 V	160	80.90	33.30
4	*2412.00	104.6 AV			1.00 V	160	71.30	33.30
5	4824.00	45.5 PK	74.0	-28.5	1.09 V	105	39.40	6.10
6	4824.00	32.3 AV	54.0	-21.7	1.09 V	105	26.20	6.10

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.

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	2390.00	55.9 PK	74.0	-18.1	1.05 H	11	22.70	33.20
2	2390.00	45.0 AV	54.0	-9.0	1.05 H	11	11.80	33.20
3	*2437.00	111.8 PK			1.00 H	301	78.40	33.40
4	*2437.00	101.8 AV			1.00 H	301	68.40	33.40
5	4874.00	45.4 PK	74.0	-28.6	1.00 H	117	39.20	6.20
6	4874.00	32.6 AV	54.0	-21.4	1.00 H	117	26.40	6.20
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	67.1 PK	74.0	-6.9	1.00 V	175	33.90	33.20
2	2390.00	52.5 AV	54.0	-1.5	1.00 V	175	19.30	33.20
3	*2437.00	123.5 PK			1.00 V	158	90.10	33.40
4	*2437.00	114.1 AV			1.00 V	158	80.70	33.40
5	4874.00	46.7 PK	74.0	-27.3	1.11 V	88	40.50	6.20
6	4874.00	33.0 AV	54.0	-21.0	1.11 V	88	26.80	6.20

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.

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	101.7 PK			1.00 H	334	68.40	33.30
2	*2462.00	92.3 AV			1.00 H	334	59.00	33.30
3	2483.50	56.3 PK	74.0	-17.7	1.56 H	141	22.90	33.40
4	2483.50	45.8 AV	54.0	-8.2	1.56 H	141	12.40	33.40
5	4924.00	46.7 PK	74.0	-27.3	1.11 H	118	40.40	6.30
6	4924.00	32.8 AV	54.0	-21.2	1.11 H	118	26.50	6.30
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	111.9 PK			1.00 V	160	78.60	33.30
2	*2462.00	103.0 AV			1.00 V	160	69.70	33.30
3	2483.50	63.8 PK	74.0	-10.2	1.00 V	159	30.40	33.40
4	2483.50	49.5 AV	54.0	-4.5	1.00 V	159	16.10	33.40
5	4924.00	46.0 PK	74.0	-28.0	1.00 V	96	39.70	6.30
6	4924.00	32.8 AV	54.0	-21.2	1.00 V	96	26.50	6.30

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.

802.11n (HT40)

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

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	57.0 PK	74.0	-17.0	1.00 H	27	23.80	33.20
2	2390.00	45.6 AV	54.0	-8.4	1.00 H	27	12.40	33.20
3	*2422.00	98.7 PK			1.00 H	217	65.40	33.30
4	*2422.00	89.4 AV			1.00 H	217	56.10	33.30
5	4844.00	46.3 PK	74.0	-27.7	1.08 H	246	40.20	6.10
6	4844.00	32.6 AV	54.0	-21.4	1.08 H	246	26.50	6.10
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	66.0 PK	74.0	-8.0	1.00 V	158	32.80	33.20
2	2390.00	52.7 AV	54.0	-1.3	1.00 V	158	19.50	33.20
3	*2422.00	110.8 PK			1.00 V	158	77.50	33.30
4	*2422.00	100.8 AV			1.00 V	158	67.50	33.30
5	4844.00	45.5 PK	74.0	-28.5	1.01 V	246	39.40	6.10
6	4844.00	32.5 AV	54.0	-21.5	1.01 V	246	26.40	6.10

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.

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	2390.00	56.5 PK	74.0	-17.5	1.00 H	186	23.30	33.20
2	2390.00	45.9 AV	54.0	-8.1	1.00 H	186	12.70	33.20
3	*2437.00	102.1 PK			1.00 H	301	68.70	33.40
4	*2437.00	92.8 AV			1.00 H	301	59.40	33.40
5	4874.00	45.7 PK	74.0	-28.3	1.09 H	45	39.50	6.20
6	4874.00	32.7 AV	54.0	-21.3	1.09 H	45	26.50	6.20
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	66.7 PK	74.0	-7.3	1.00 V	186	33.50	33.20
2	2390.00	51.7 AV	54.0	-2.3	1.00 V	186	18.50	33.20
3	*2437.00	113.5 PK			1.00 V	160	80.10	33.40
4	*2437.00	104.2 AV			1.00 V	160	70.80	33.40
5	4874.00	46.0 PK	74.0	-28.0	1.05 V	102	39.80	6.20
6	4874.00	32.5 AV	54.0	-21.5	1.05 V	102	26.30	6.20

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.

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	97.0 PK			1.00 H	217	63.60	33.40
2	*2452.00	88.3 AV			1.00 H	217	54.90	33.40
3	2483.50	55.8 PK	74.0	-18.2	1.02 H	83	22.40	33.40
4	2483.50	45.4 AV	54.0	-8.6	1.02 H	83	12.00	33.40
5	4904.00	45.3 PK	74.0	-28.7	1.06 H	101	39.20	6.10
6	4904.00	32.5 AV	54.0	-21.5	1.06 H	101	26.40	6.10
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	108.5 PK			1.00 V	159	75.10	33.40
2	*2452.00	99.1 AV			1.00 V	159	65.70	33.40
3	2483.50	62.4 PK	74.0	-11.6	1.00 V	183	29.00	33.40
4	2483.50	50.1 AV	54.0	-3.9	1.00 V	183	16.70	33.40
5	4904.00	45.4 PK	74.0	-28.6	1.00 V	89	39.30	6.10
6	4904.00	32.5 AV	54.0	-21.5	1.00 V	89	26.40	6.10

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.

BELOW 1GHz WORST-CASE DATA：802.11b

CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 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	57.12	32.3 QP	40.0	-7.7	2.00 H	257	46.90	-14.60
2	134.89	32.6 QP	43.5	-10.9	2.00 H	252	47.40	-14.80
3	360.43	32.0 QP	46.0	-14.0	1.01 H	16	43.20	-11.20
4	500.42	32.7 QP	46.0	-13.3	1.51 H	153	41.00	-8.30
5	834.84	34.8 QP	46.0	-11.2	1.51 H	21	36.50	-1.70
6	961.21	42.7 QP	54.0	-11.3	1.51 H	104	42.00	0.70
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	45.45	31.5 QP	40.0	-8.5	1.49 V	293	46.20	-14.70
2	113.50	33.9 QP	43.5	-9.6	1.49 V	331	50.70	-16.80
3	136.84	27.8 QP	43.5	-15.7	1.00 V	270	42.50	-14.70
4	189.33	27.5 QP	43.5	-16.0	1.00 V	298	43.70	-16.20
5	500.42	35.8 QP	46.0	-10.2	1.00 V	244	44.10	-8.30
6	961.21	42.2 QP	54.0	-11.8	1.00 V	40	41.50	0.70

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

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	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 0.50MHz.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100612	Sep. 30, 2014	Sep. 29, 2015
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 13, 2014	Feb. 12, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 21, 2014	Jul. 20, 2015
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 HwaYa Shielded Room 1.

3. The VCCI Site Registration No. is C-2040.

4.2.3 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. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

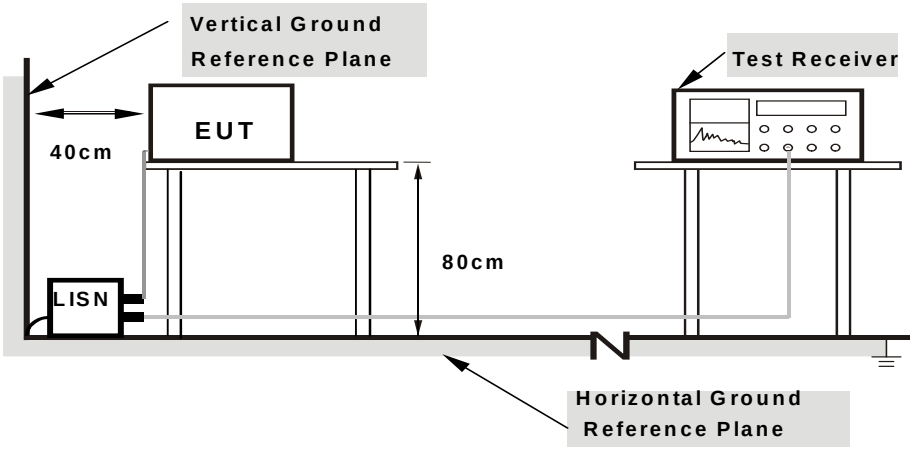
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: 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



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

4.2.7 TEST RESULTS

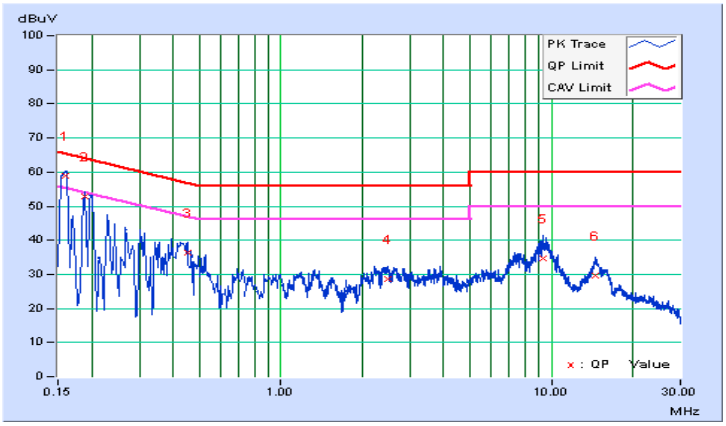
CONDUCTED WORST-CASE DATA：802.11b

PHASE	Line 1	6dB BANDWIDTH	9kHz

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.16054**	**0.08**	**58.86**	**42.45**	**58.94**	**42.53**	**65.44**	**55.44**	**-6.50**	**-12.91**
2	0.18853	0.07	52.91	34.79	52.98	34.86	64.10	54.10	-11.12	-19.24
3	0.45097	0.08	36.12	24.56	36.20	24.64	56.86	46.86	-20.65	-22.21
4	2.49600	0.17	28.46	19.39	28.63	19.56	56.00	46.00	-27.37	-26.44
5	9.37760	0.48	34.15	25.38	34.63	25.86	60.00	50.00	-25.37	-24.14
6	14.48797	0.75	28.85	23.66	29.60	24.41	60.00	50.00	-30.40	-25.59

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.

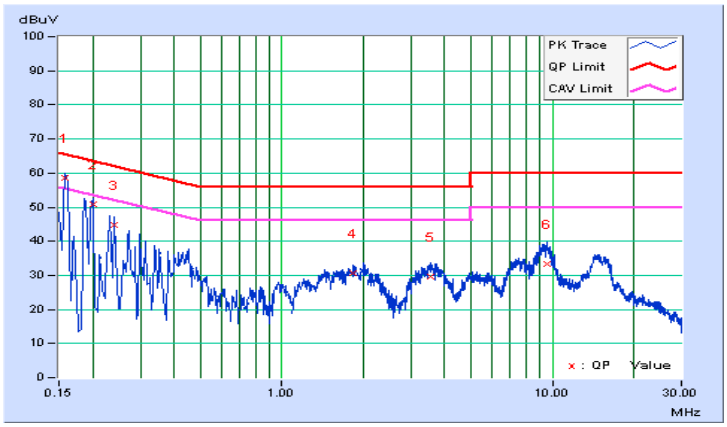


PHASE	Line 2	6dB BANDWIDTH	9kHz

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15802	0.05	58.44	43.49	58.49	43.54	65.57	55.57	-7.08	-12.03
2	0.20031	0.05	50.92	35.48	50.97	35.53	63.60	53.60	-12.63	-18.07
3	0.23993	0.05	44.62	29.89	44.67	29.94	62.10	52.10	-17.42	-22.15
4	1.82719	0.13	30.60	22.09	30.73	22.22	56.00	46.00	-25.27	-23.78
5	3.54003	0.19	29.34	22.08	29.53	22.27	56.00	46.00	-26.47	-23.73
6	9.53390	0.42	33.06	23.79	33.48	24.21	60.00	50.00	-26.52	-25.79

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.

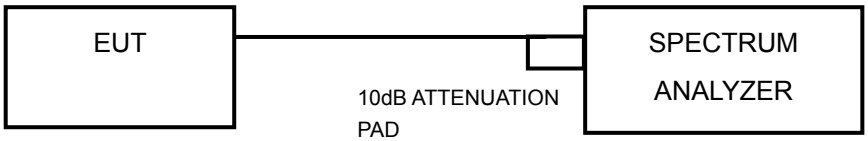


4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.3.4 TEST PROCEDURE

558074 D01 DTS Meas Guidance v03r02 section 8.1

a. Set RBW = 100 kHz.
b. Set the video bandwidth (VBW) ≥ 3 × RBW.
c. Detector = Peak.
d. Trace mode = max hold.
e. Sweep = auto couple.
f. Allow the trace to stabilize.
g. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

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.

4.3.7 TEST RESULTS

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	9.07	8.60	9.06	0.5	PASS
6	2437	9.07	9.10	8.61	0.5	PASS
11	2462	8.57	9.05	8.57	0.5	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	15.51	16.40	16.42	0.5	PASS
6	2437	16.39	16.38	16.37	0.5	PASS
11	2462	16.36	16.40	16.40	0.5	PASS

802.11n (HT20)

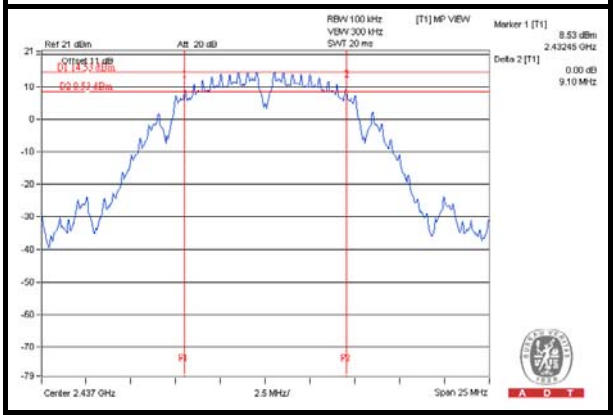
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	15.37	17.66	17.66	0.5	PASS
6	2437	17.39	17.63	17.58	0.5	PASS
11	2462	17.62	17.65	17.64	0.5	PASS

802.11n (HT40)

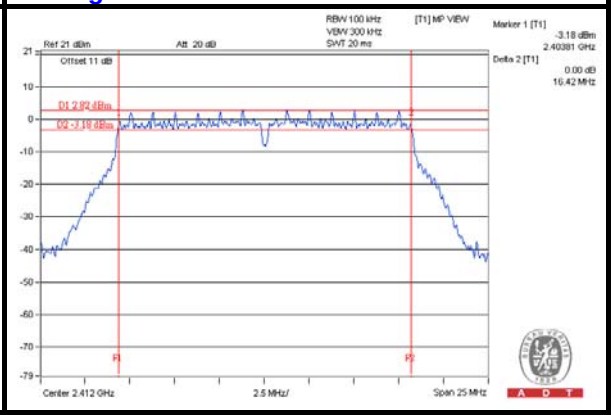
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	36.42	36.44	36.14	0.5	PASS
6	2437	36.15	36.35	36.01	0.5	PASS
9	2452	35.81	36.44	36.10	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

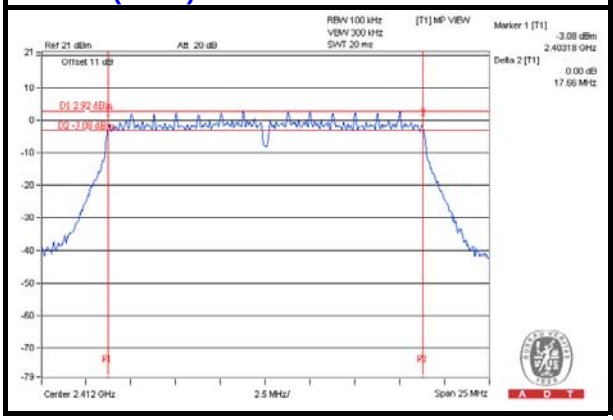
802.11b



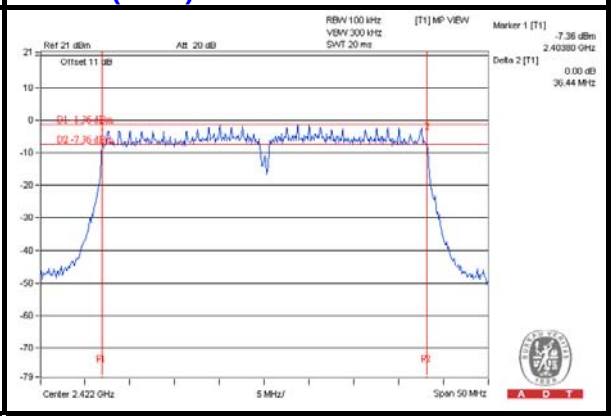
802.11g



802.11n (HT20)



802.11n (HT40)



4.4 CONDUCTED OUTPUT POWER

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

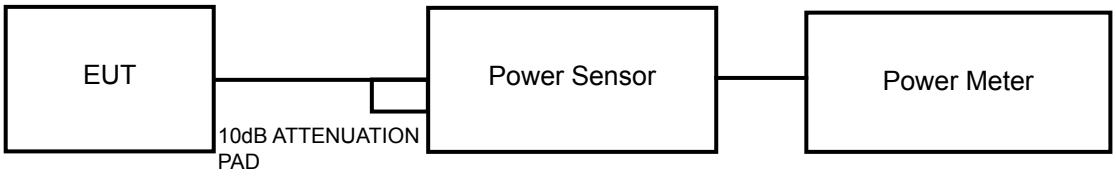
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output v02r01 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 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 ≥ 5.

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

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.4.4 TEST PROCEDURES

558074 D01 DTS Meas Guidance v03r02 section 9.2.3.2

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

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

4.4.7 TEST RESULTS

FOR AVERAGE POWER

802.11b

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	17.91	17.81	17.93	184.284	22.65	30	PASS
6	2437	23.87	23.77	24.25	**748.086**	28.74	30	PASS
11	2462	19.32	19.29	19.39	257.321	24.10	30	PASS

802.11g

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	13.74	14.01	14.26	75.505	18.78	30	PASS
6	2437	23.82	23.61	24.23	735.456	28.67	30	PASS
11	2462	13.98	13.99	14.41	77.67	18.90	30	PASS

802.11n (HT20)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	13.87	13.81	14.24	74.968	18.75	30	PASS
6	2437	23.75	23.79	24.22	740.71	28.70	30	PASS
11	2462	13.96	13.99	14.14	75.892	18.80	30	PASS

802.11n (HT40)

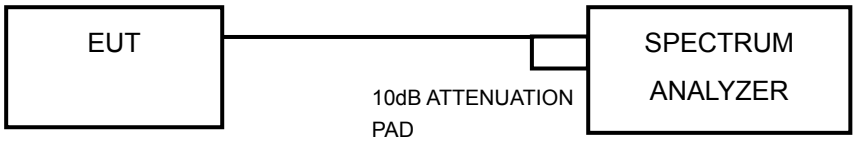
CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
3	2422	12.91	12.66	13.14	58.599	17.68	30	PASS
6	2437	16.54	16.66	17.34	145.627	21.63	30	PASS
9	2452	12.92	12.77	13.46	60.693	17.83	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.5.4 TEST PROCEDURE

558074 D01 DTS Meas Guidance v03r02 section 10.3

a. Set instrument center frequency to DTS channel center frequency.
b. Set span to at least 1.5 times the OBW.
c. Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d. Set VBW ≥3 x RBW.
e. Detector = power averaging (RMS) or sample detector (when RMS not available).
f. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g. Sweep time = auto couple.
h. Employ trace averaging (RMS) mode over a minimum of 100 traces.
i. Use the peak marker function to determine the maximum amplitude level.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6.

4.5.7 TEST RESULTS

802.11b

TX chain	Channel	FREQ. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-9.93	4.77	-5.16	7.13	PASS
	6	2437	-4.34	4.77	0.43	7.13	PASS
	11	2462	-8.06	4.77	-3.29	7.13	PASS
1	1	2412	-9.58	4.77	-4.81	7.13	PASS
	6	2437	-4.79	4.77	-0.02	7.13	PASS
	11	2462	-8.79	4.77	-4.02	7.13	PASS
2	1	2412	-9.89	4.77	-5.12	7.13	PASS
	6	2437	-4.25	4.77	0.52	7.13	PASS
	11	2462	-8.53	4.77	-3.76	7.13	PASS

NOTE: Directional gain = 2.1dBi + 10log(3) = 6.87dBi > 6dBi, so the power density limit shall be reduced to 8-(6.87-6) = 7.13dBm.

802.11g

TX chain	Channel	FREQ. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-16.28	4.77	-11.51	7.13	PASS
	6	2437	-5.97	4.77	-1.20	7.13	PASS
	11	2462	-15.13	4.77	-10.36	7.13	PASS
1	1	2412	-13.76	4.77	-8.99	7.13	PASS
	6	2437	-5.89	4.77	-1.12	7.13	PASS
	11	2462	-14.76	4.77	-9.99	7.13	PASS
2	1	2412	-15.18	4.77	-10.41	7.13	PASS
	6	2437	-5.83	4.77	-1.06	7.13	PASS
	11	2462	-15.14	4.77	-10.37	7.13	PASS

NOTE: Directional gain = 2.1dBi + 10log(3) = 6.87dBi > 6dBi, so the power density limit shall be reduced to 8-(6.87-6) = 7.13dBm.

802.11n (HT20)

TX chain	Chan.	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD without Duty Factor (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	1	2422	-16.80	4.77	-12.03	0.09	-11.94	7.13	PASS
	6	2437	-7.39	4.77	-2.62	0.09	-2.53	7.13	PASS
	11	2452	-17.02	4.77	-12.25	0.09	-12.16	7.13	PASS
1	1	2422	-14.21	4.77	-9.44	0.09	-9.35	7.13	PASS
	6	2437	-5.81	4.77	-1.04	0.09	-0.95	7.13	PASS
	11	2452	-14.88	4.77	-10.11	0.09	-10.02	7.13	PASS
2	1	2422	-16.98	4.77	-12.21	0.09	-12.12	7.13	PASS
	6	2437	-7.38	4.77	-2.61	0.09	-2.52	7.13	PASS
	11	2452	-16.42	4.77	-11.65	0.09	-11.56	7.13	PASS

NOTE:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 2.1dBi + 10log(3) = 6.87dBi > 6dBi, so the power density limit shall be reduced to 8-(6.87-6) = 7.13dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

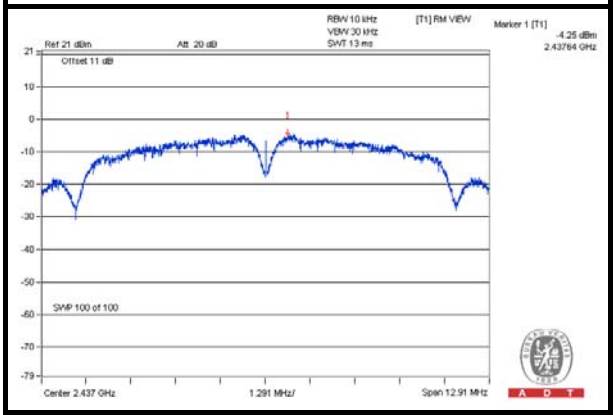
TX chain	Chan.	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD without Duty Factor (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	3	2422	-20.79	4.77	-16.02	0.11	-15.91	7.13	PASS
	6	2437	-16.44	4.77	-11.67	0.11	-11.56	7.13	PASS
	9	2452	-20.46	4.77	-15.69	0.11	-15.58	7.13	PASS
1	3	2422	-17.92	4.77	-13.15	0.11	-13.04	7.13	PASS
	6	2437	-15.65	4.77	-10.88	0.11	-10.77	7.13	PASS
	9	2452	-18.58	4.77	-13.81	0.11	-13.70	7.13	PASS
2	3	2422	-20.60	4.77	-15.83	0.11	-15.72	7.13	PASS
	6	2437	-15.93	4.77	-11.16	0.11	-11.05	7.13	PASS
	9	2452	-19.80	4.77	-15.03	0.11	-14.92	7.13	PASS

NOTE:

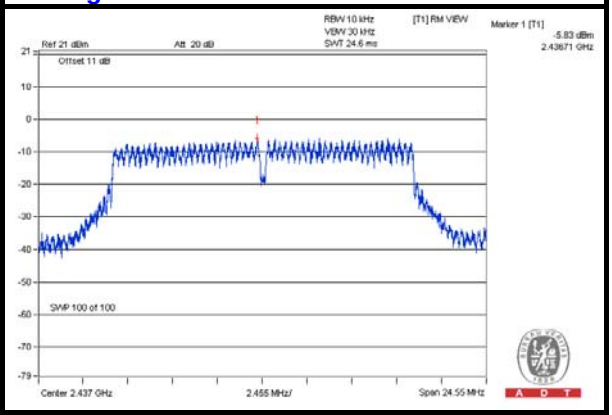
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 2.1dBi + 10log(3) = 6.87dBi > 6dBi, so the power density limit shall be reduced to 8-(6.87-6) = 7.13dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE

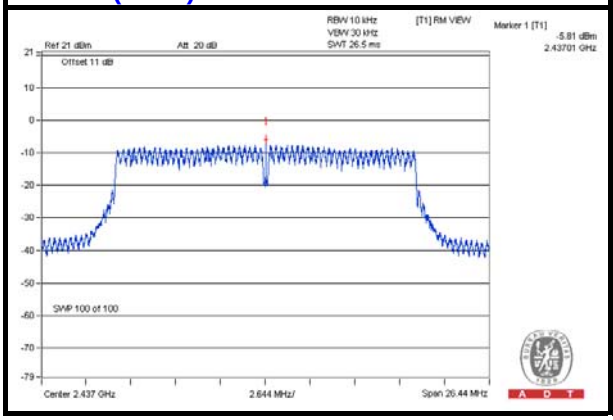
802.11b



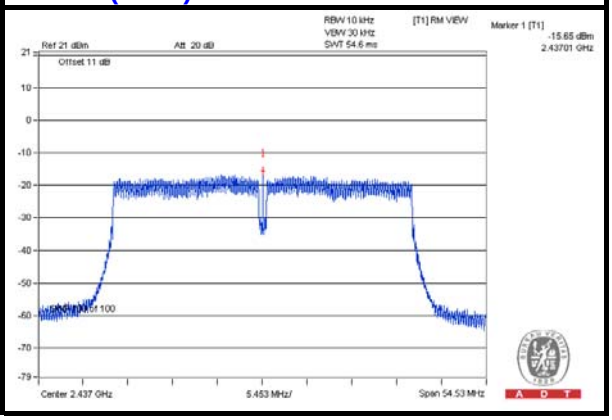
802.11g



802.11n (HT20)



802.11n (HT40)

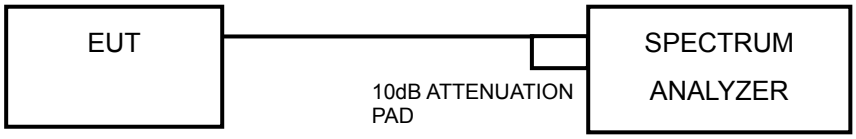


4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

Below -30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 TEST SETUP



4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.6.4 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

558074 D01 DTS Meas Guidance v03r02 section 11.2

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 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 OOBE

558074 D01 DTS Meas Guidance v03r02 section 11.3

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.7 TEST RESULTS

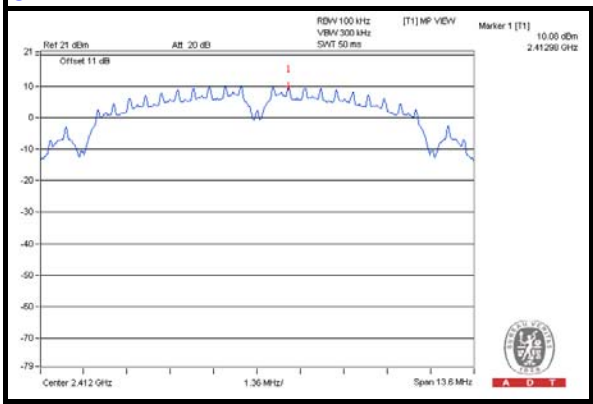
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

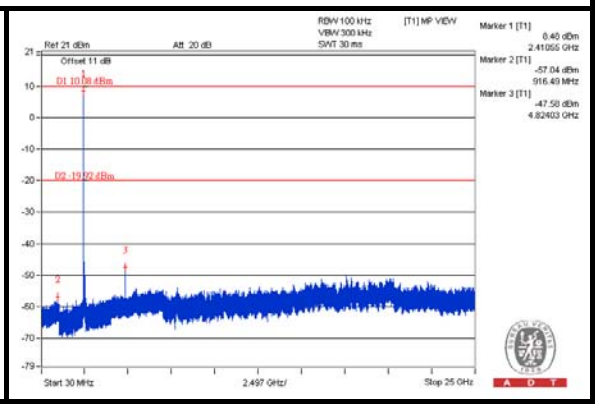
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11b

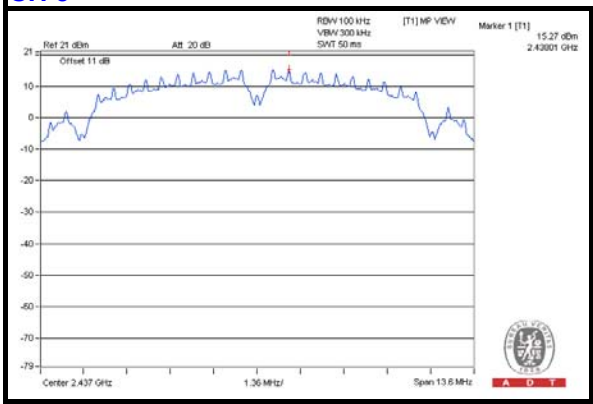
CHAIN 0

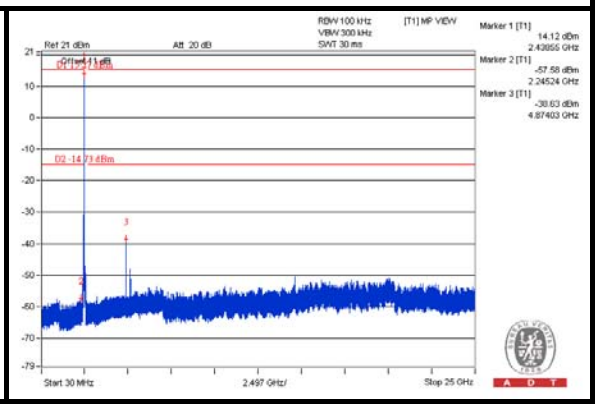
CH 1



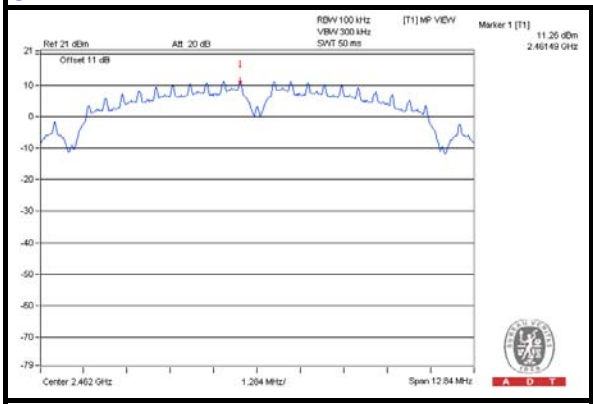


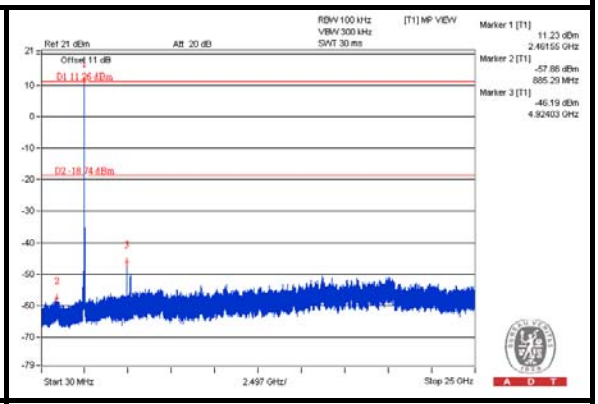
CH 6



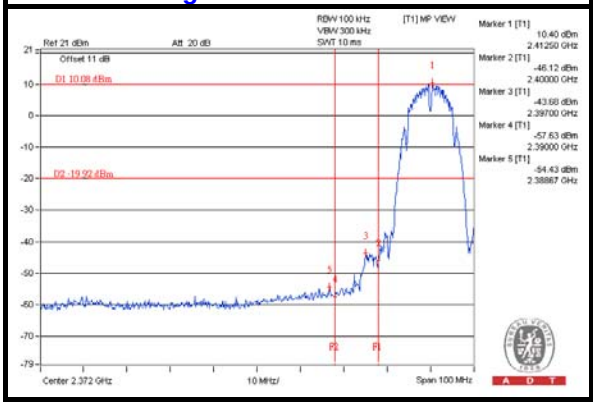


CH 11

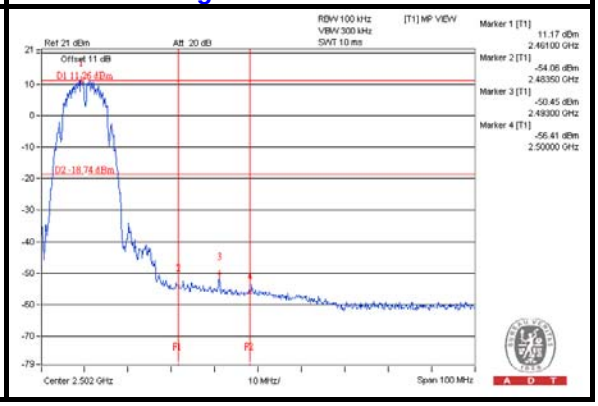




CH 1 Band edge

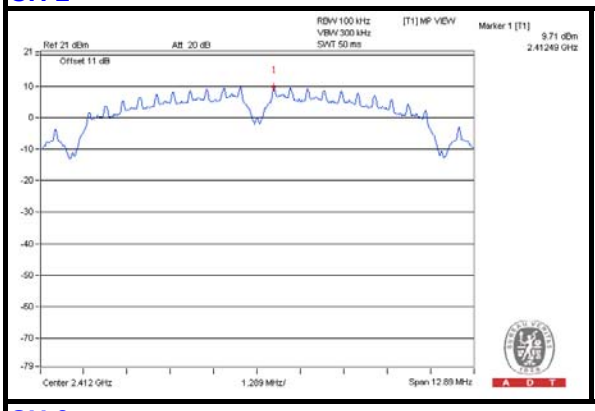


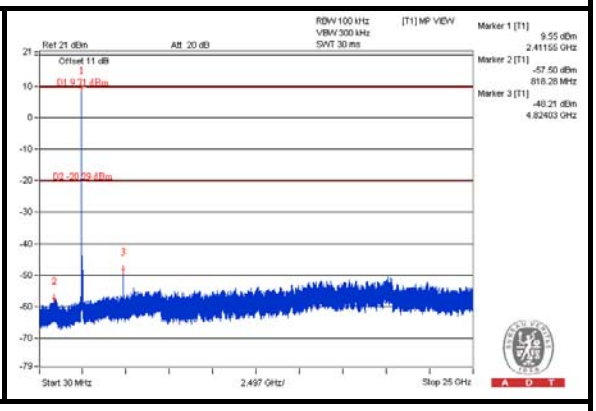
CH 11 Band edge



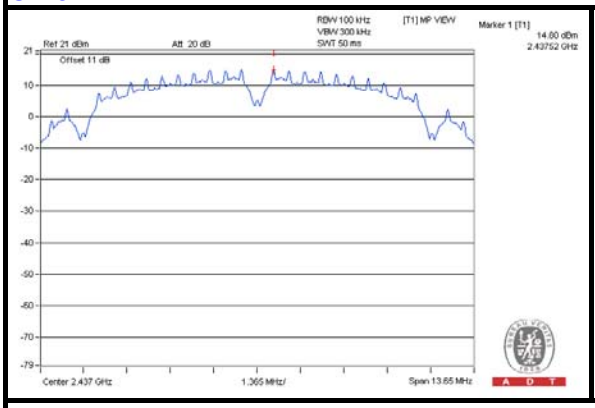
CHAIN 1

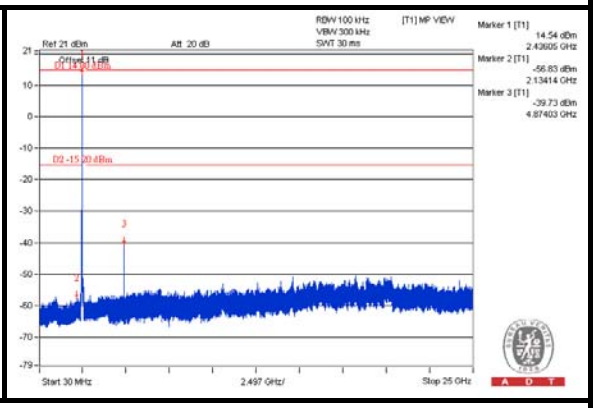
CH 1



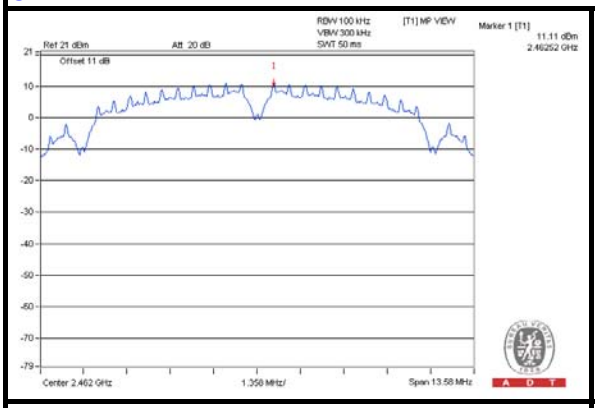


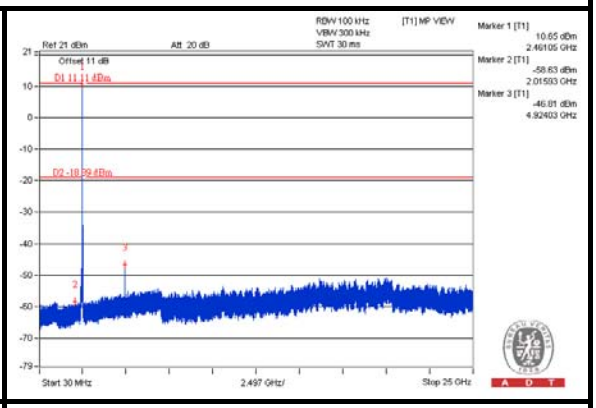
CH 6



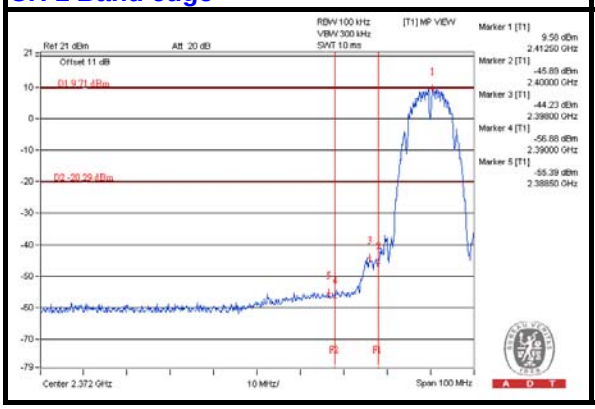


CH 11

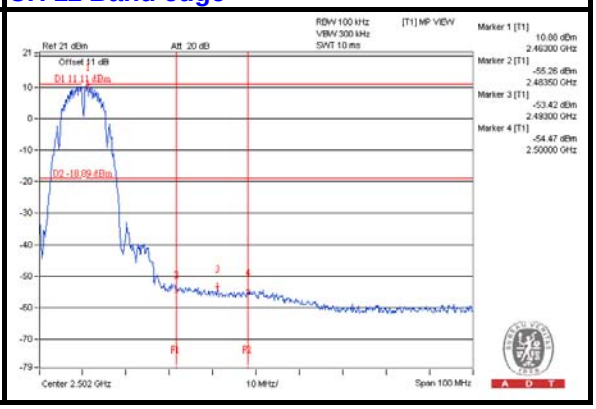




CH 1 Band edge

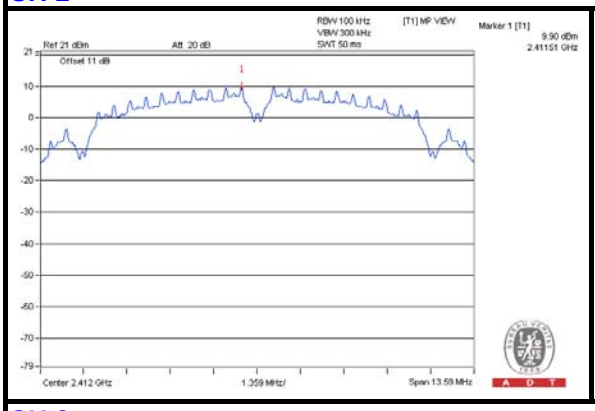


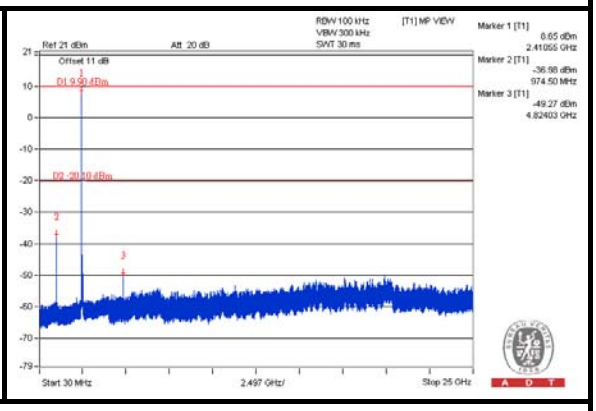
CH 11 Band edge



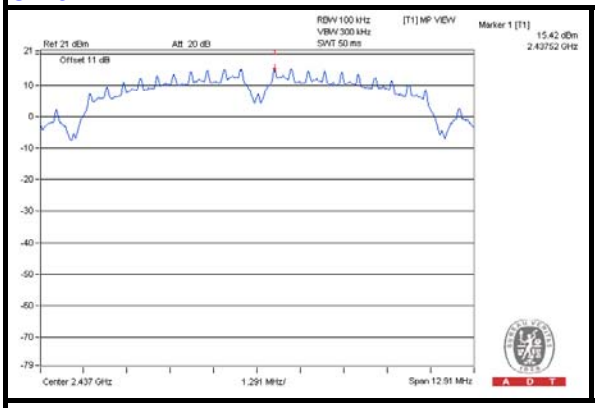
CHAIN 2

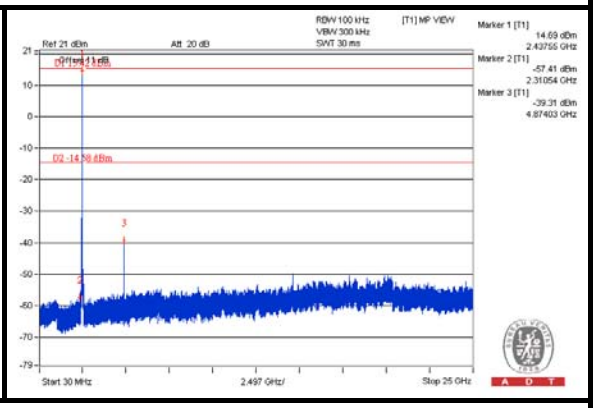
CH 1



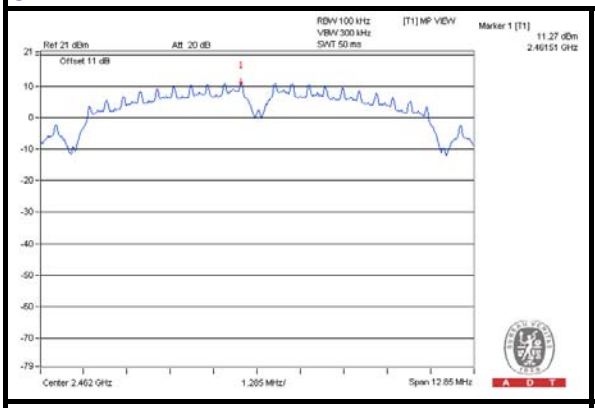


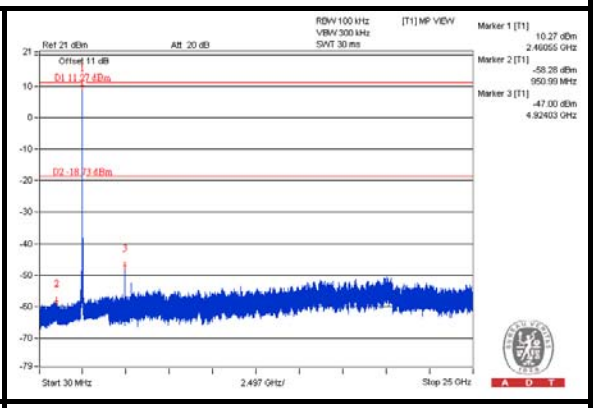
CH 6





CH 11





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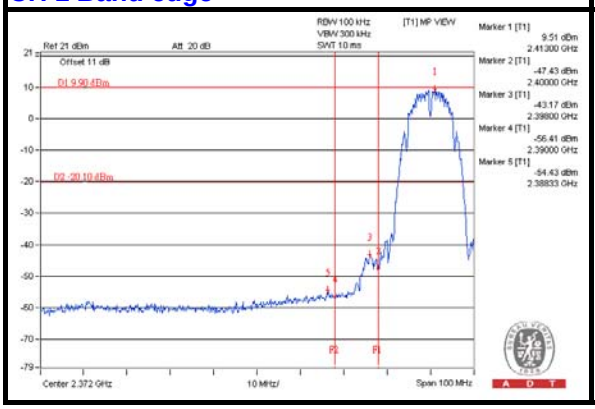

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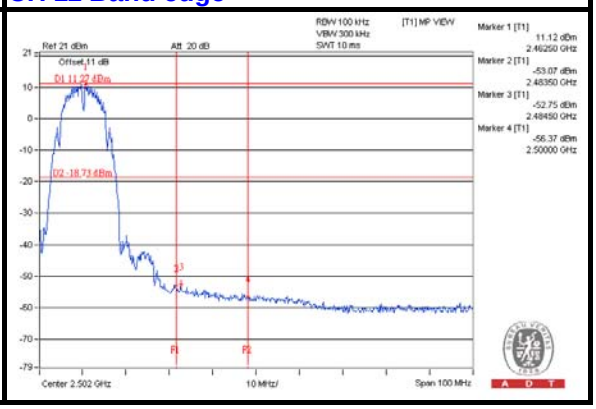

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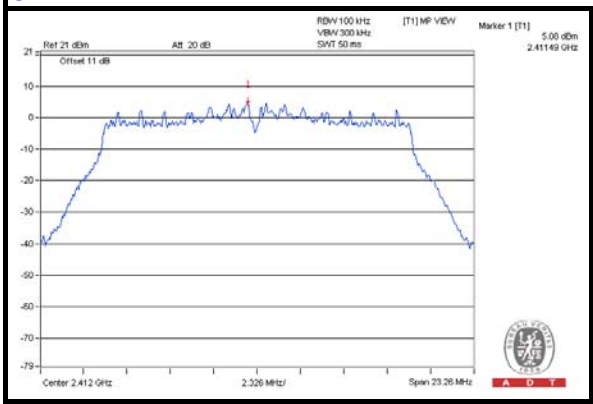
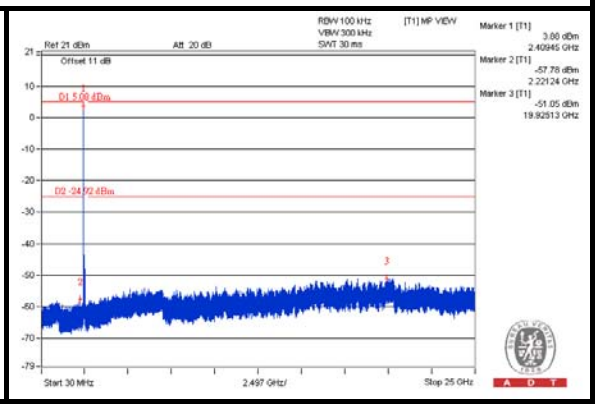
CH 1





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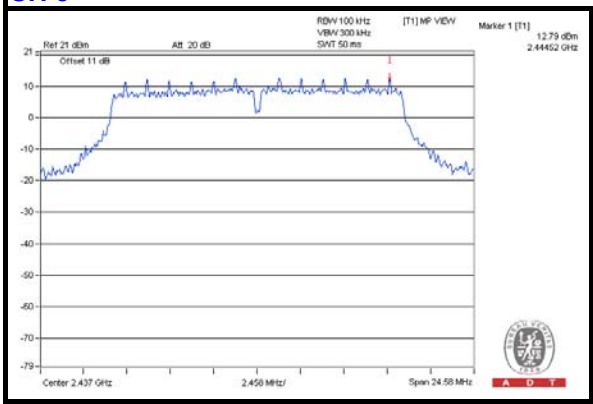

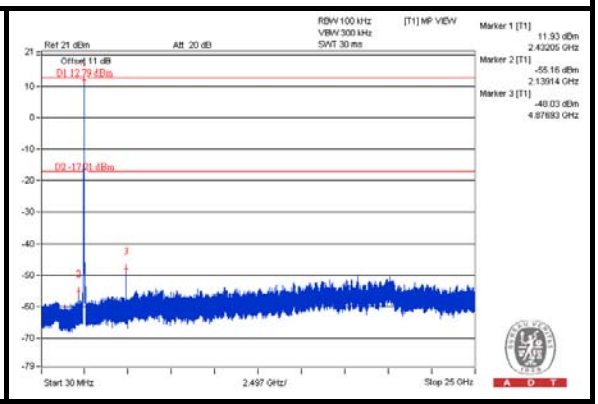

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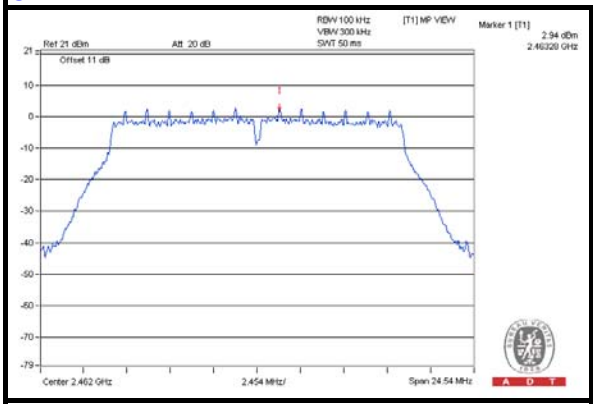

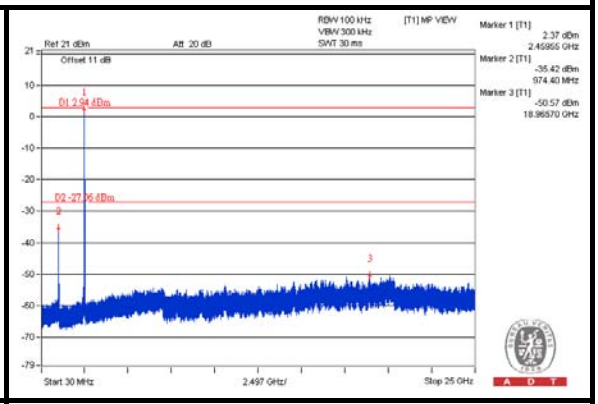

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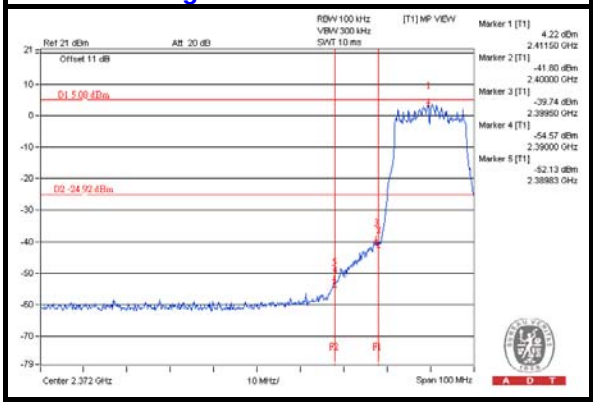

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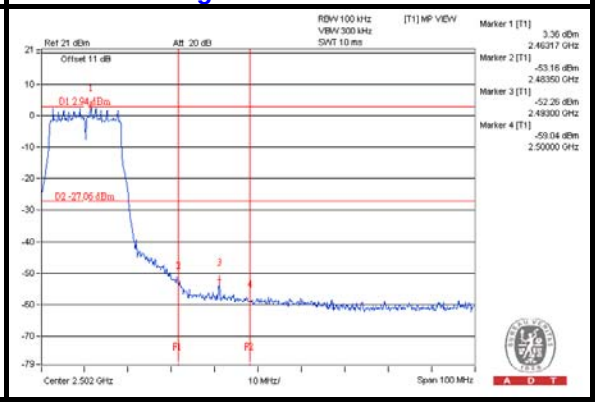

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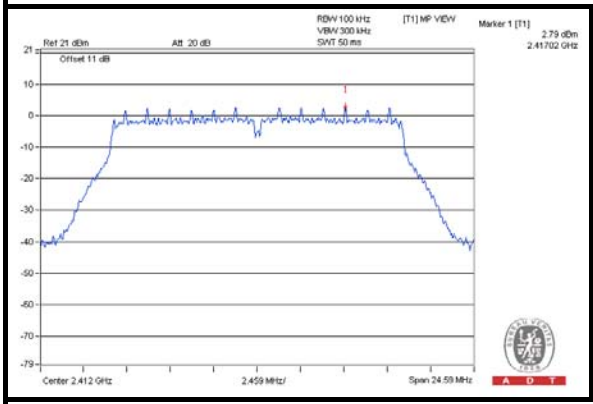

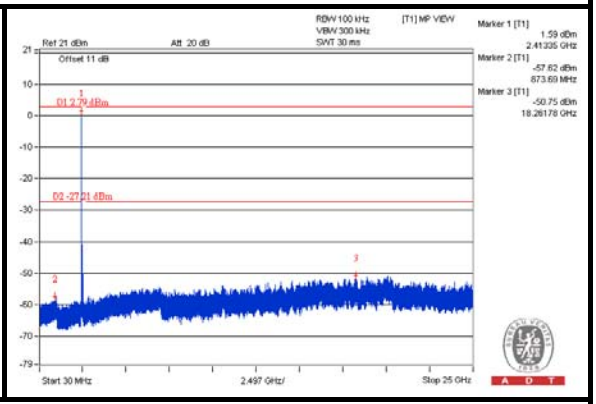

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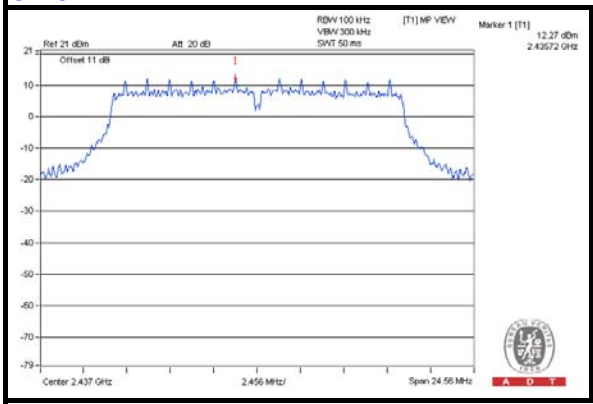

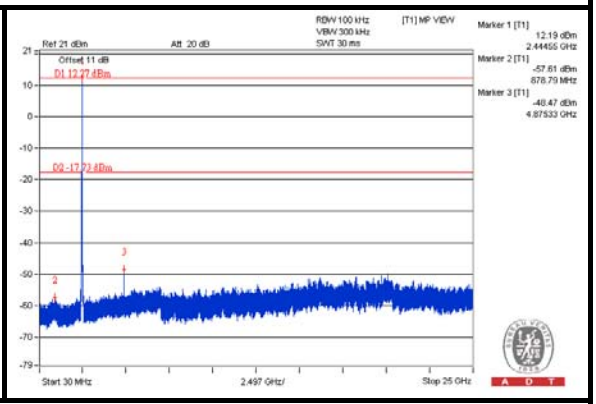

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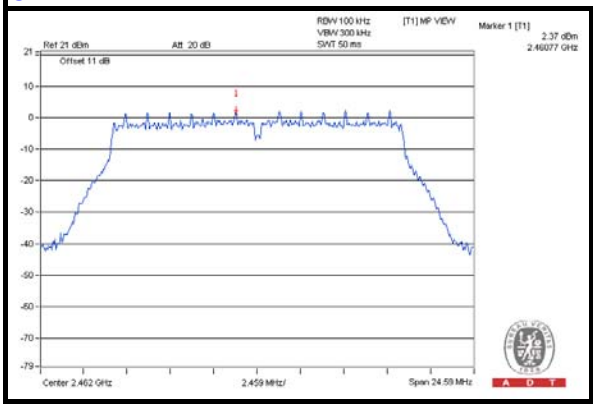

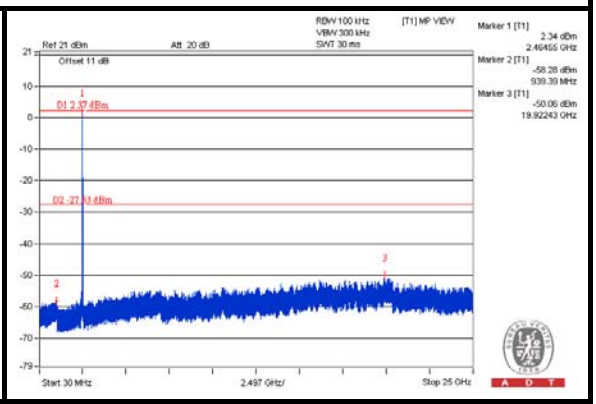

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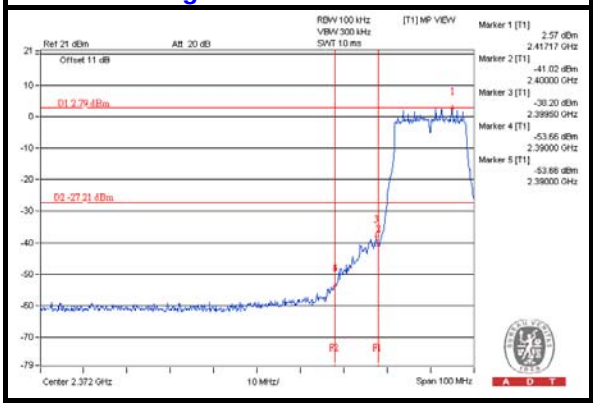

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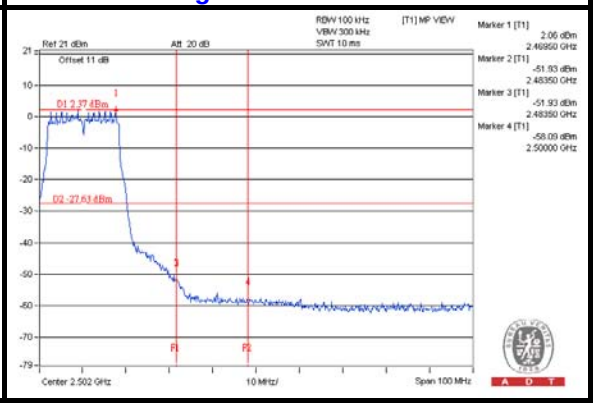

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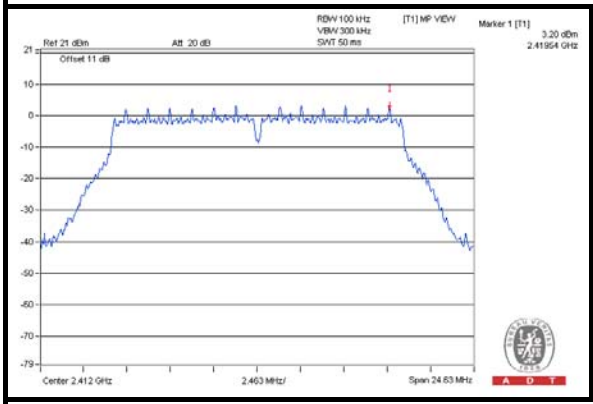

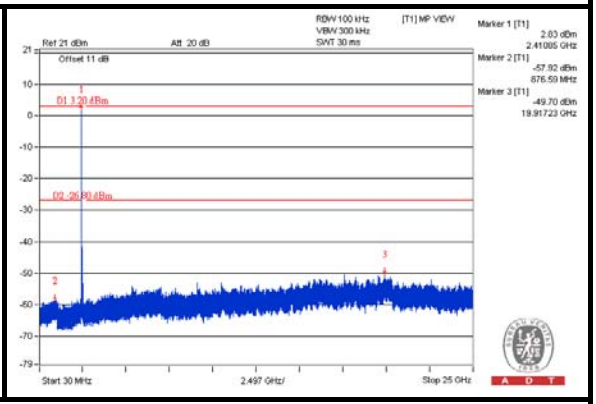

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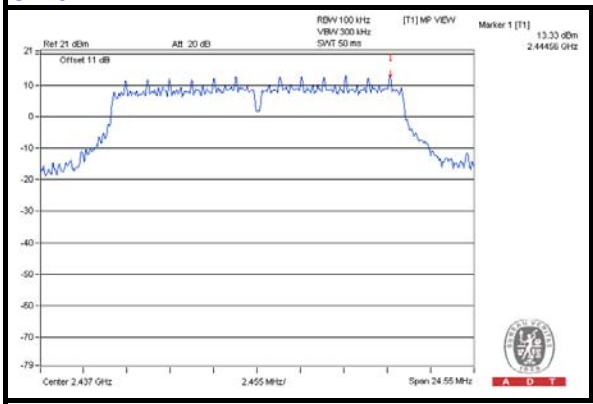

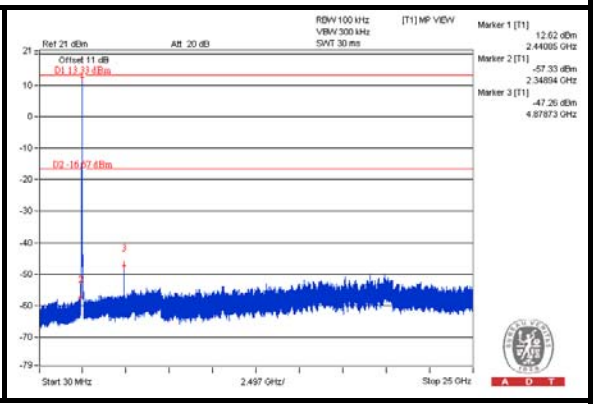

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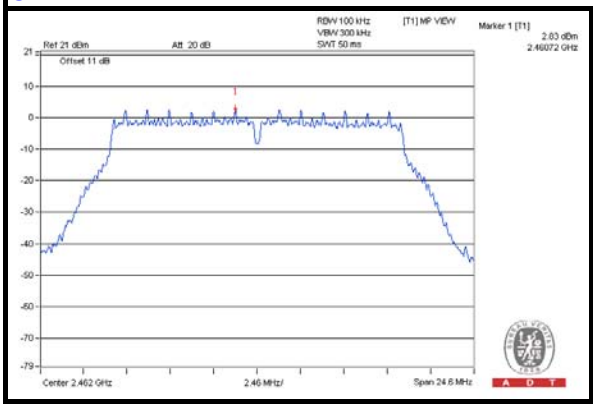

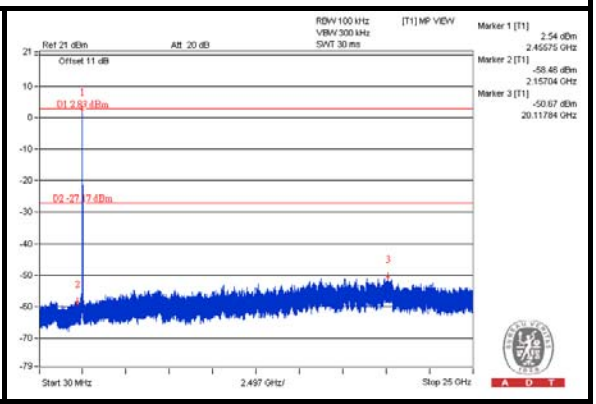

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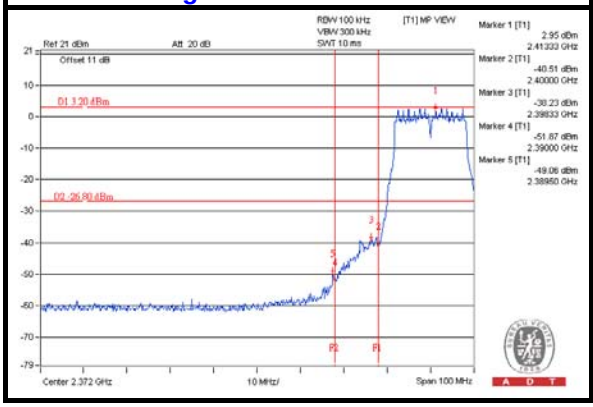

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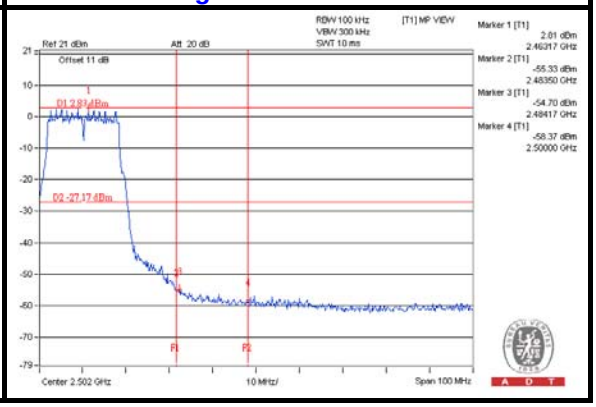

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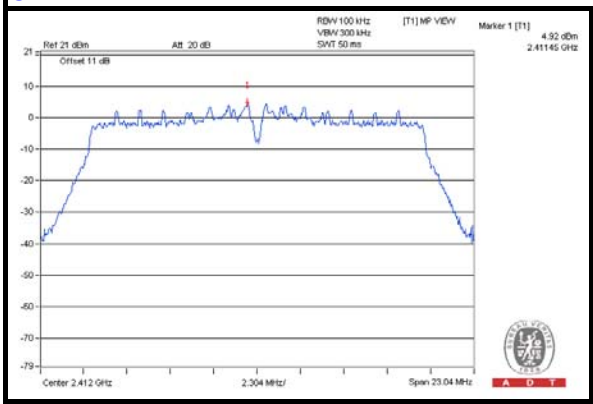

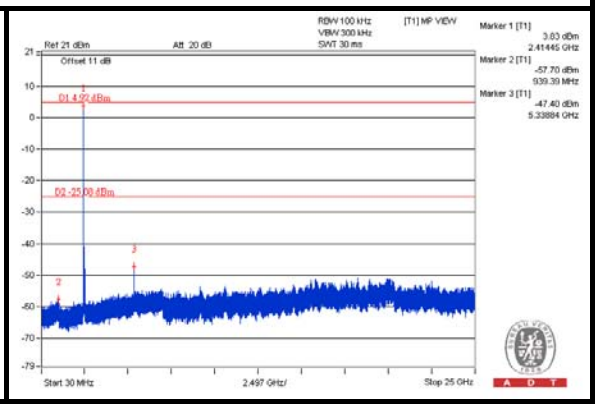

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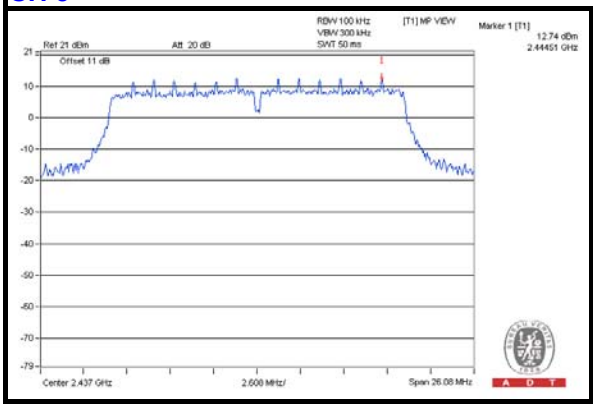

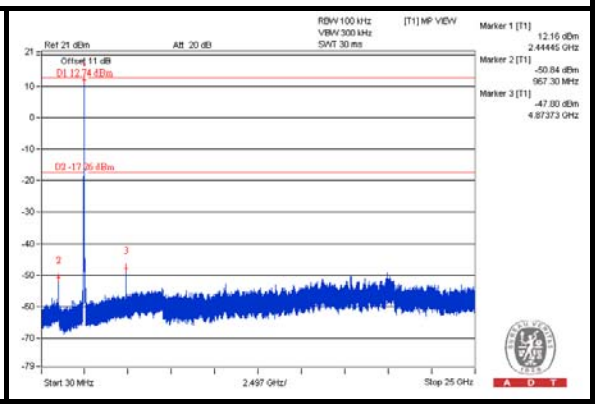

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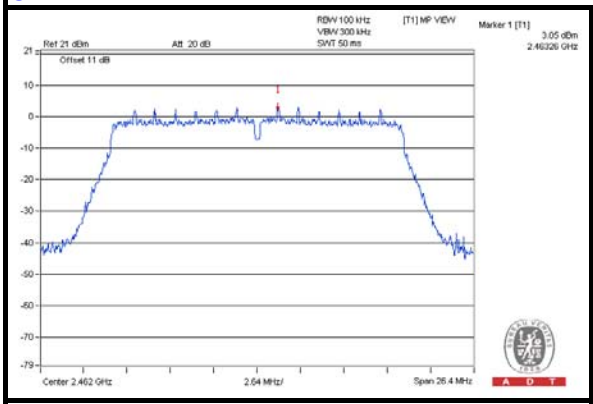

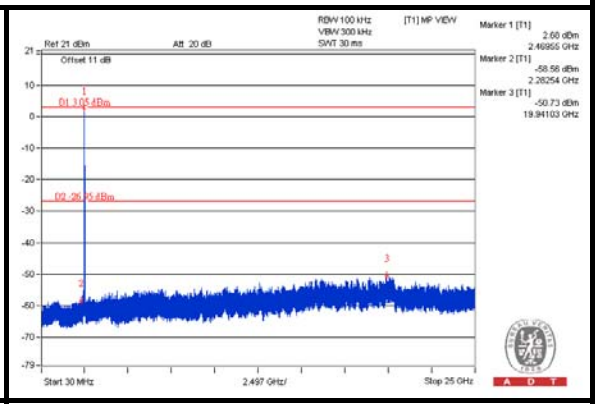

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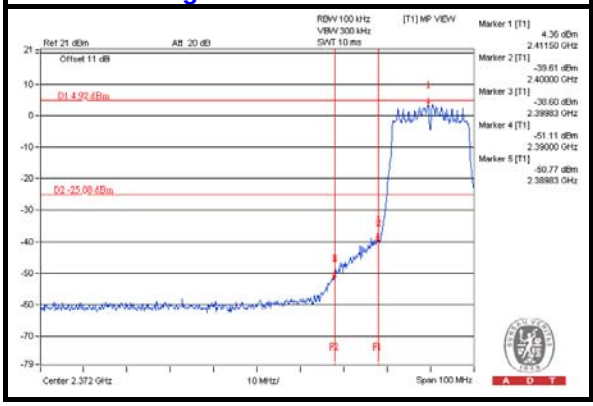

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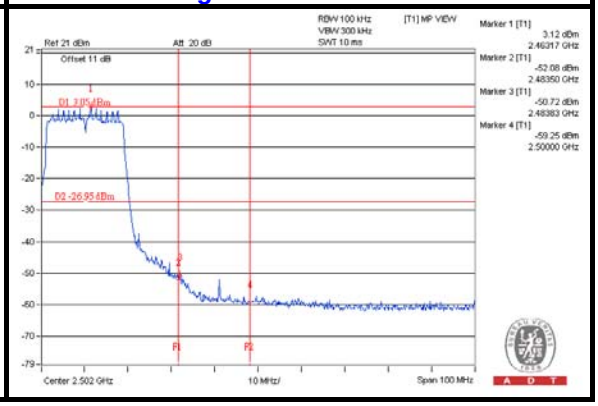

CHAIN 1

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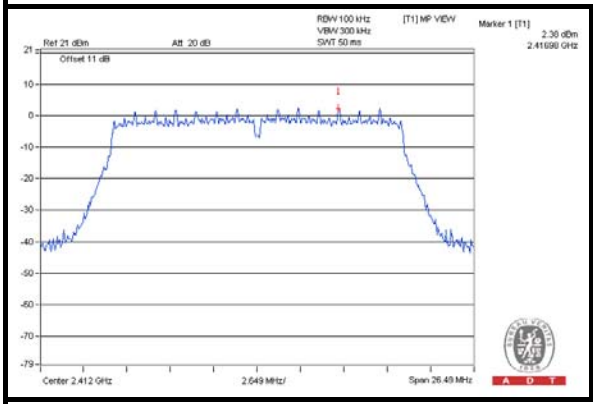

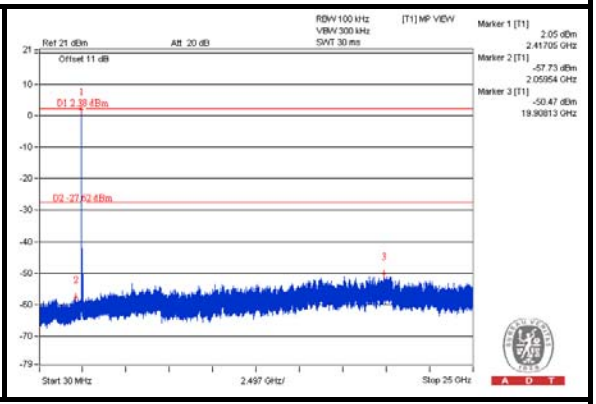

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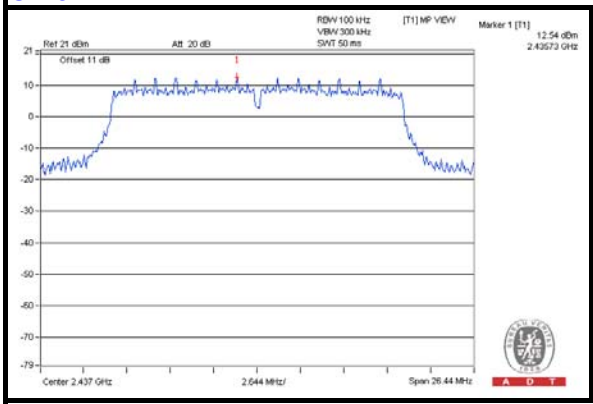

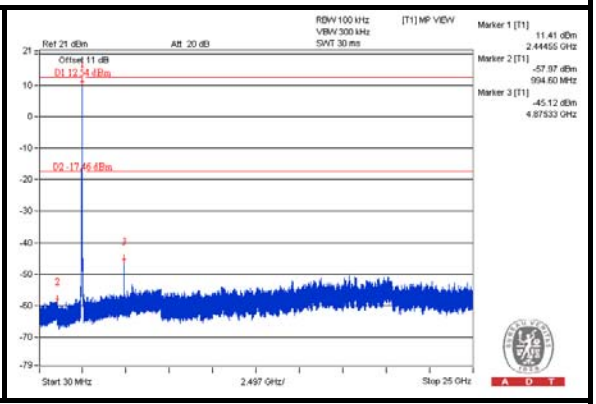

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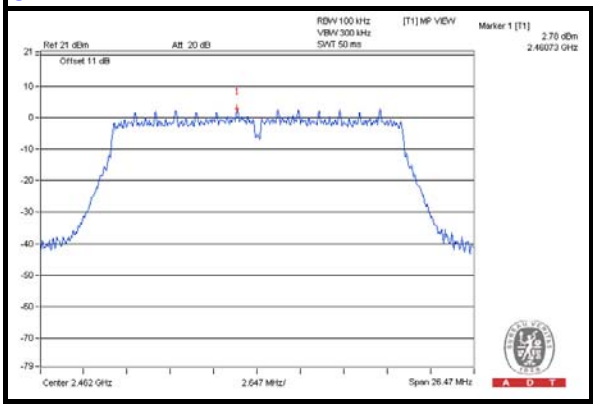

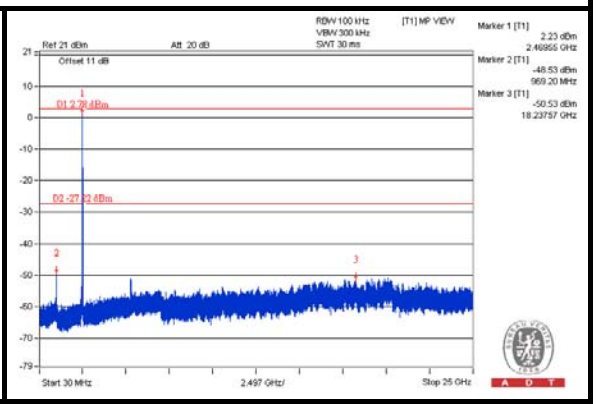

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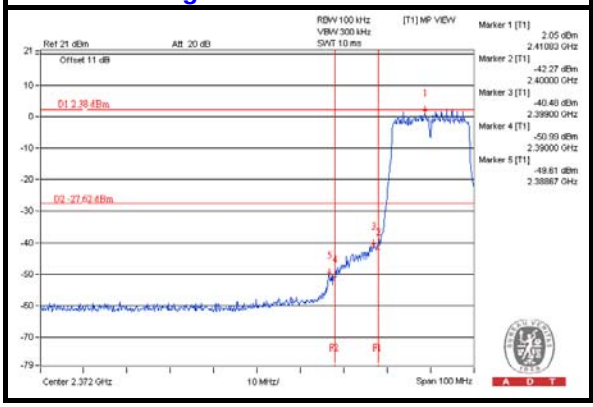

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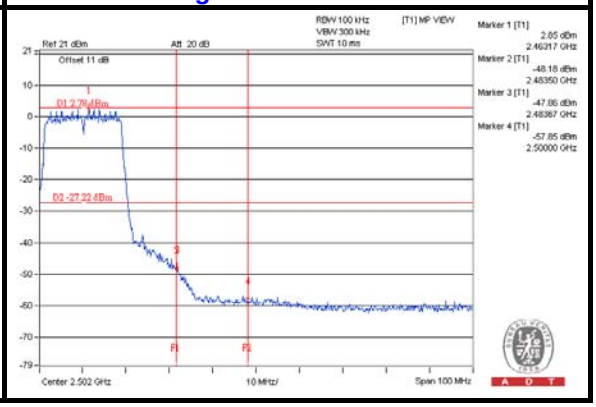

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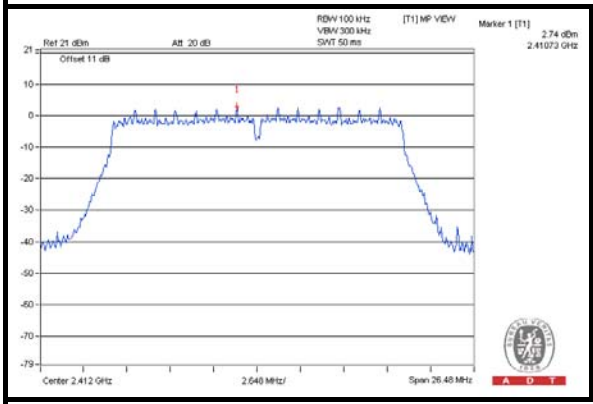

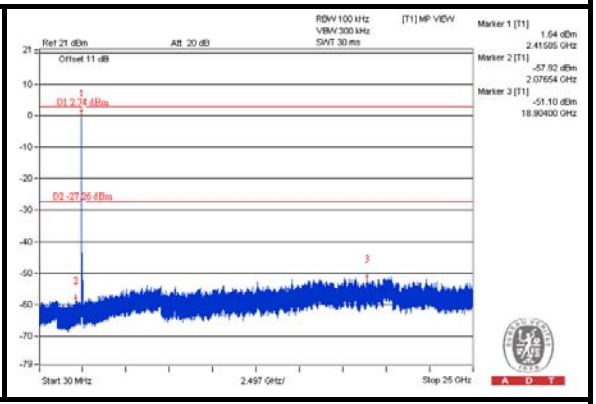

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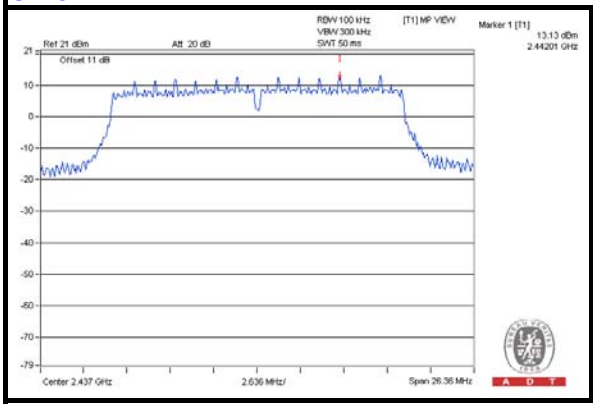

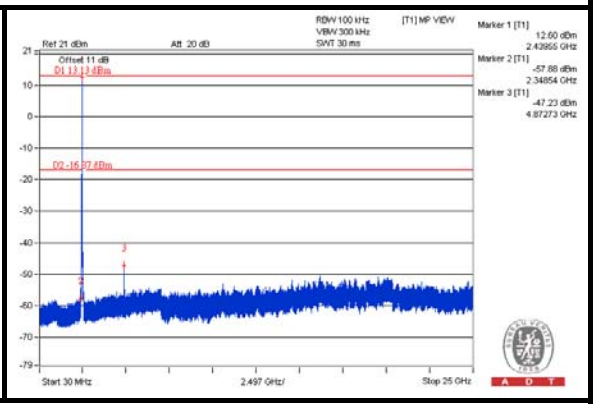

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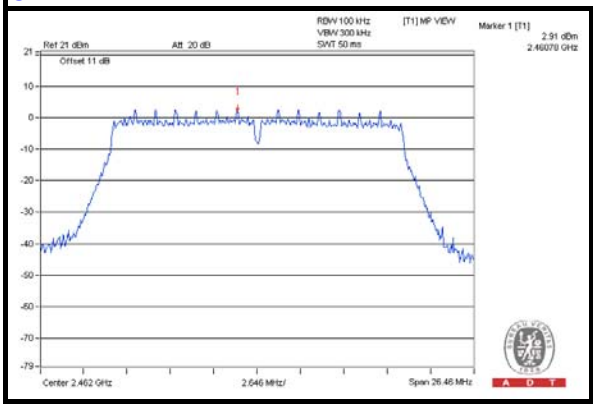

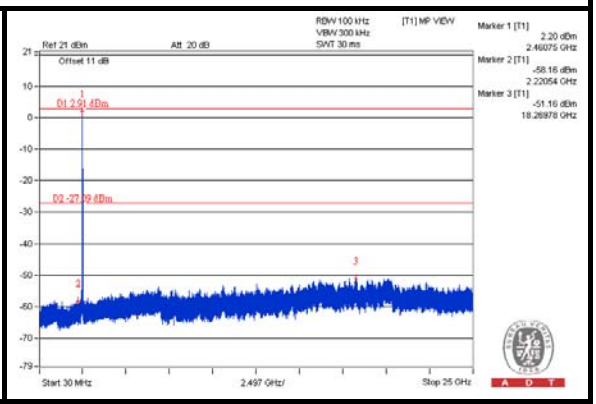

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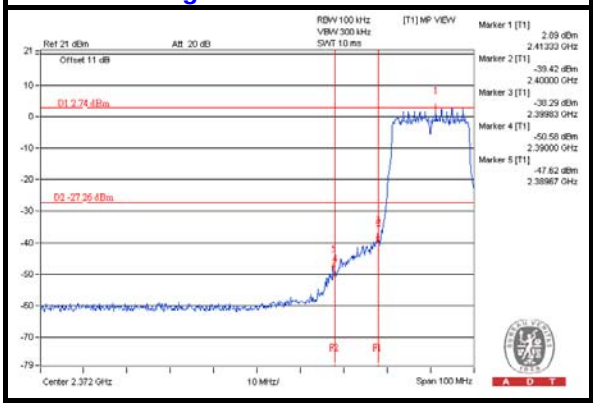

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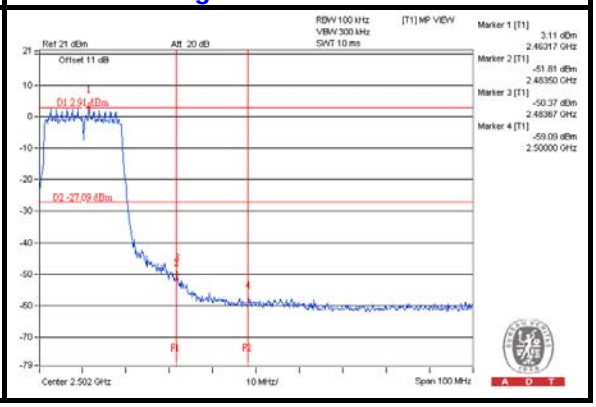

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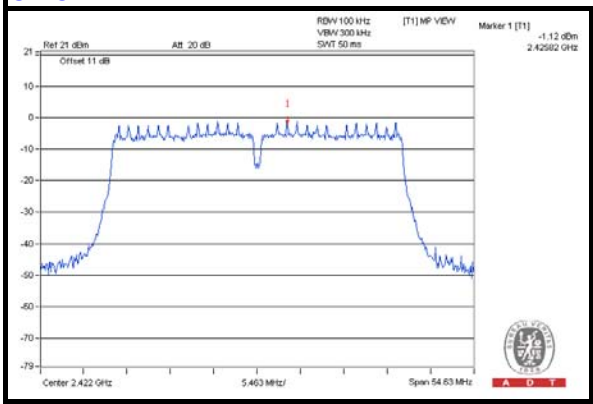
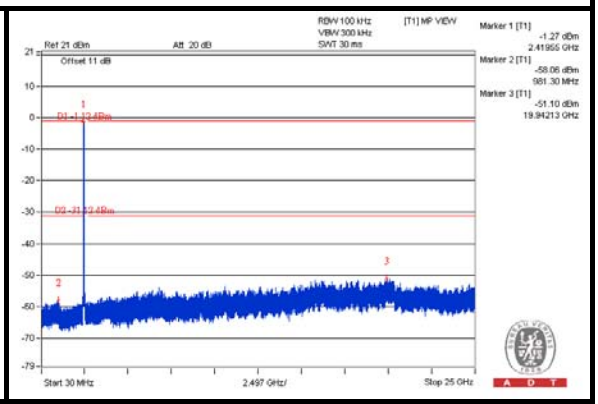
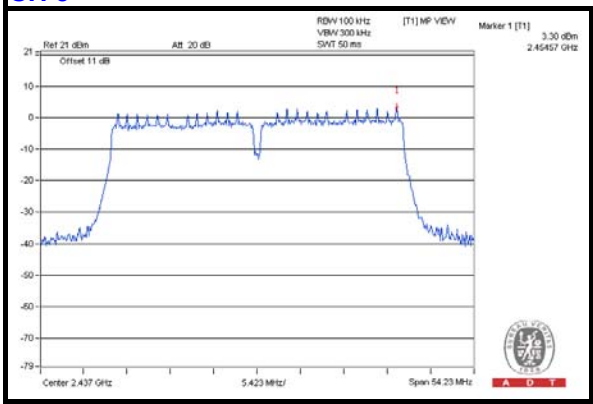
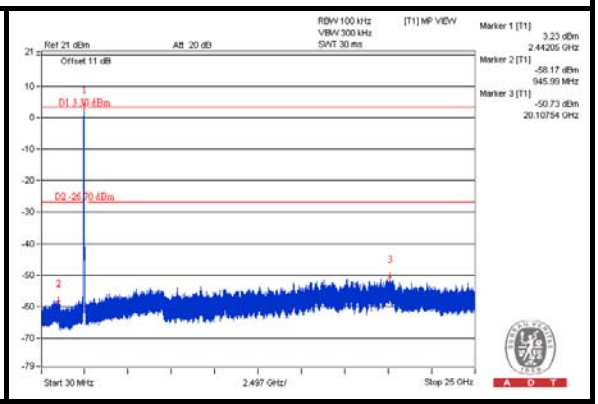


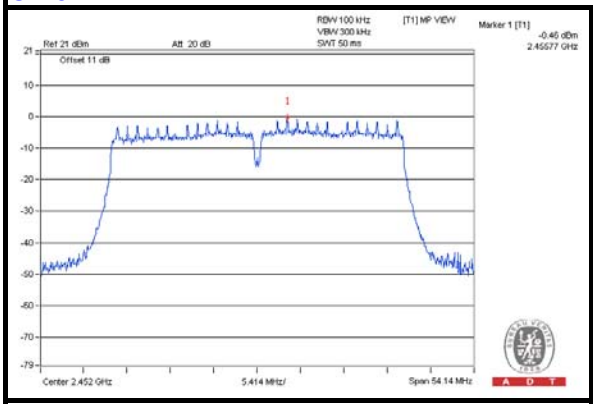


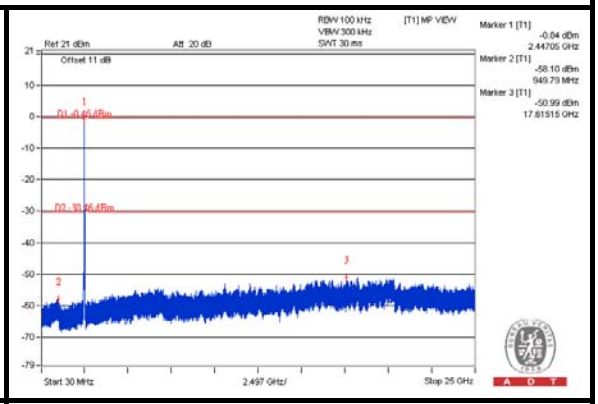
CH 6



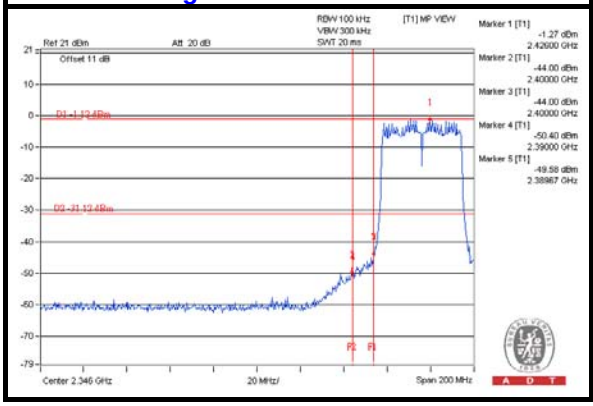


CH 9

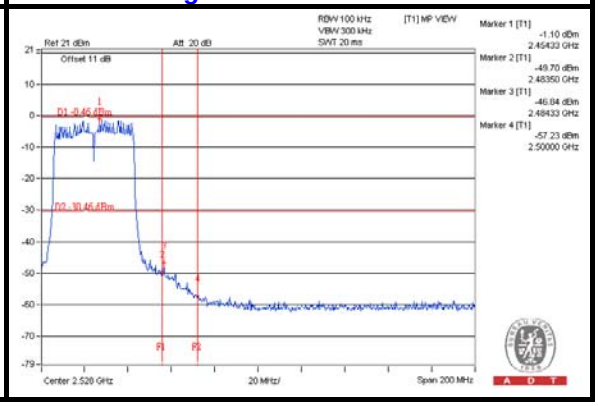




CH 3 Band edge

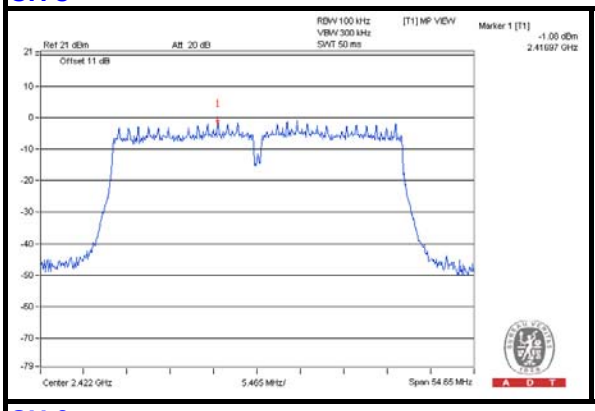


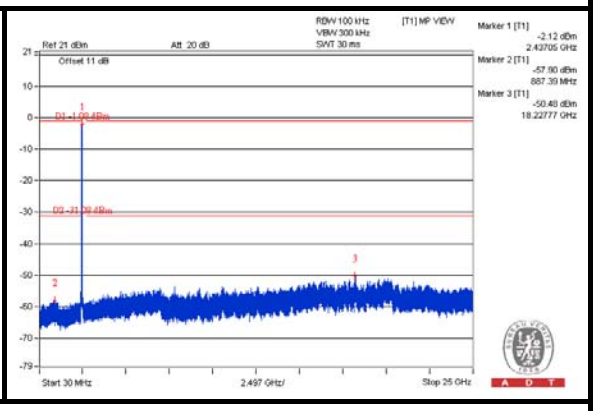
CH 9 Band edge



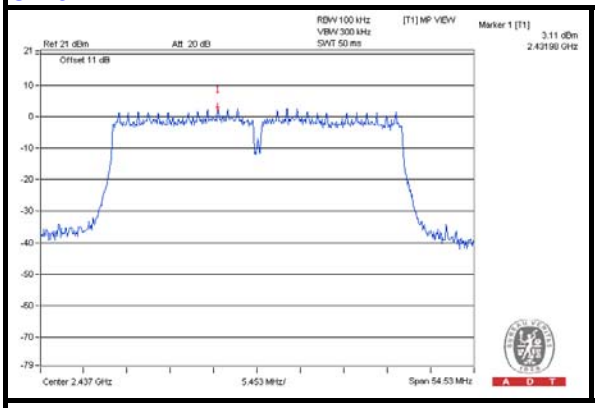
CHAIN 1

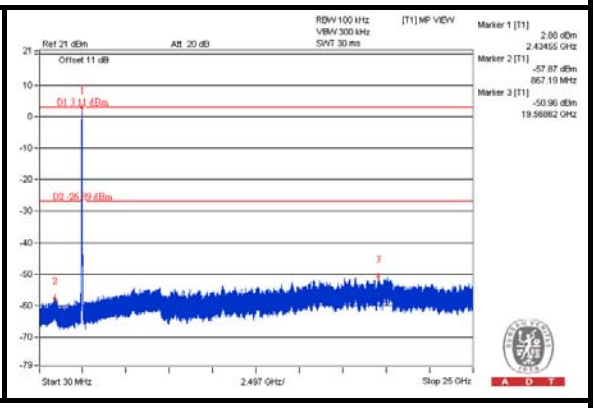
CH 3



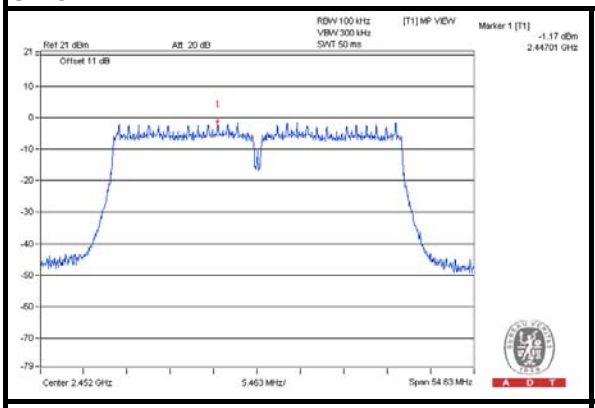


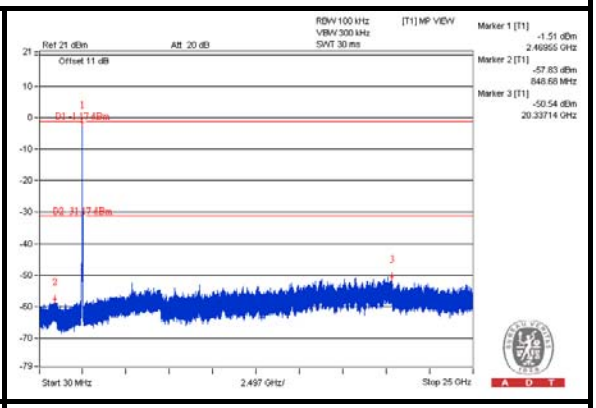
CH 6



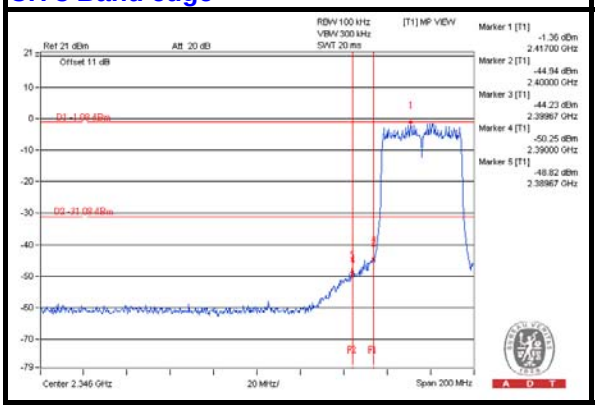


CH 9

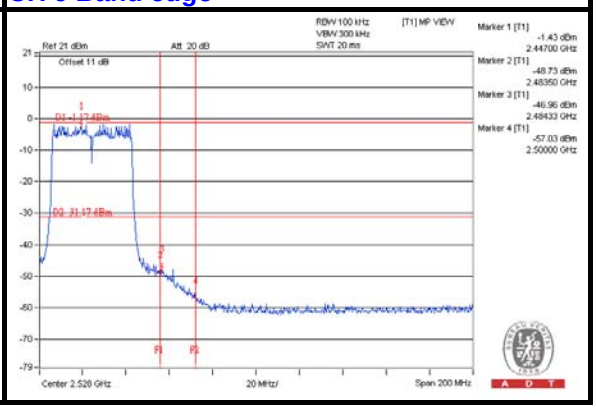




CH 3 Band edge

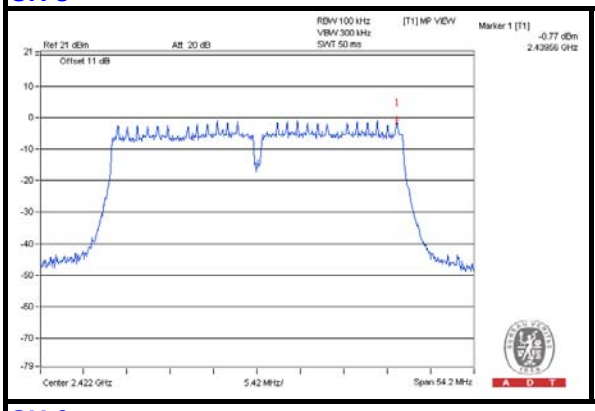


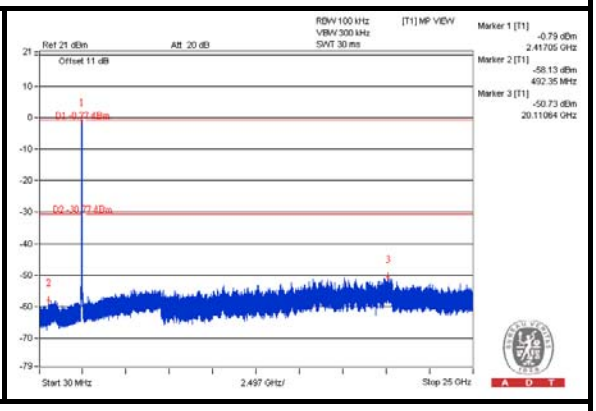
CH 9 Band edge



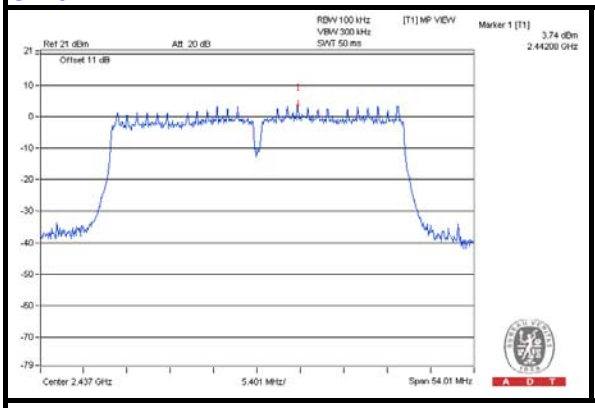
CHAIN 2

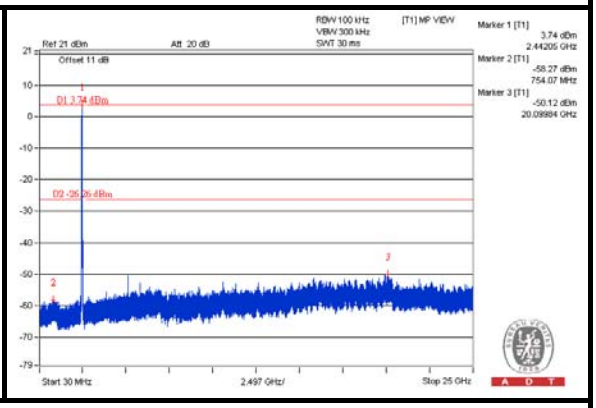
CH 3



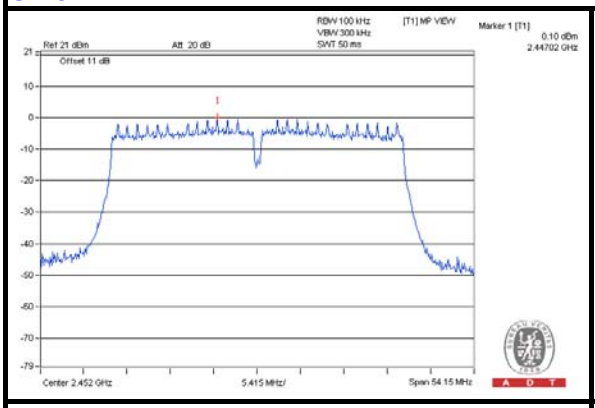


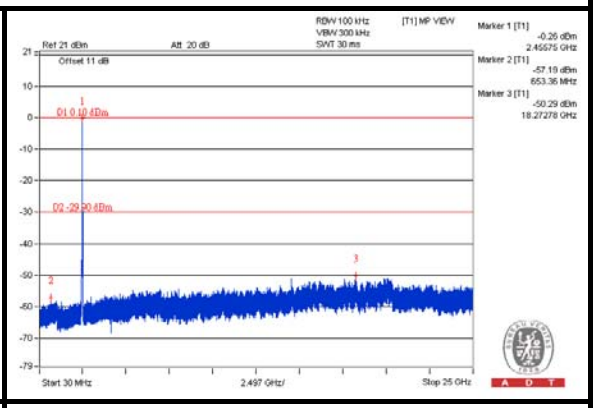
CH 6



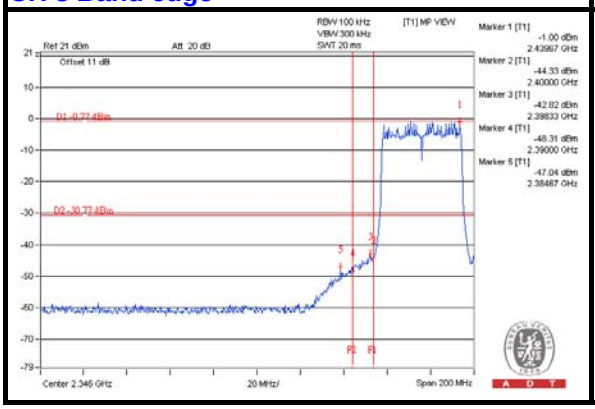


CH 9

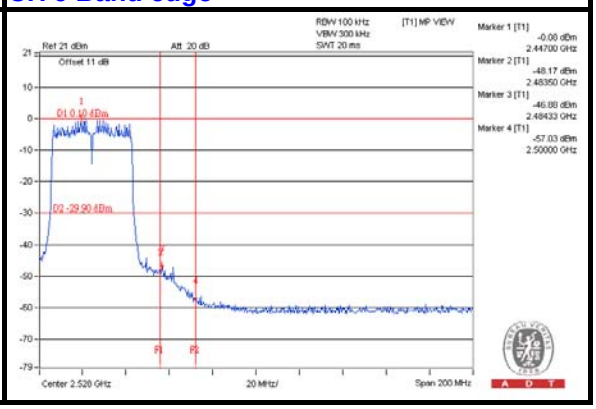




CH 3 Band edge



CH 9 Band edge



5. TEST TYPES AND RESULTS (FOR 5.0GHz BAND)

5.1 RADIATED EMISSION MEASUREMENT

5.1.1 LIMITS OF RADIATED 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 30dB 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 30dB under any condition of modulation.

5.1.2 TEST INSTRUMENTS

Same as item 4.1.2.

5.1.3 TEST PROCEDURES

Same as item 4.1.3.

5.1.4 DEVIATION FROM TEST STANDARD

No deviation.

5.1.5 TEST SETUP

Same as item 4.1.5.

5.1.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.

5.1.7 TEST RESULTS

ABOVE 1GHz DATA：

802.11a

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

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	#5725.00	80.3 PK	92.5	-12.2	1.00 H	124	73.20	7.10
2	#5725.00	70.9 AV	83.1	-12.2	1.00 H	124	63.80	7.10
3	*5745.00	112.5 PK			1.00 H	124	71.90	40.60
4	*5745.00	103.1 AV			1.00 H	124	62.50	40.60
5	11490.00	61.1 PK	74.0	-12.9	1.15 H	213	42.40	18.70
6	11490.00	49.3 AV	54.0	-4.7	1.15 H	213	30.60	18.70
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	#5725.00	95.2 PK	106.7	-11.5	1.00 V	141	88.10	7.10
2	#5725.00	85.8 AV	97.3	-11.5	1.00 V	141	78.70	7.10
3	*5745.00	126.7 PK			1.00 V	141	86.10	40.60
4	*5745.00	117.3 AV			1.00 V	141	76.70	40.60
5	11490.00	62.8 PK	74.0	-11.2	1.10 V	217	44.10	18.70
6	11490.00	50.5 AV	54.0	-3.5	1.10 V	217	31.80	18.70

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 radiated frequency is out of the restricted band.
7. The limit value is defined as per 15.247.

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	113.4 PK			1.22 H	124	72.70	40.70
2	*5785.00	103.3 AV			1.22 H	124	62.60	40.70
3	11570.00	63.3 PK	74.0	-10.7	1.21 H	215	44.50	18.80
4	11570.00	49.2 AV	54.0	-4.8	1.21 H	215	30.40	18.80
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	127.2 PK			1.16 V	170	86.50	40.70
2	*5785.00	118.0 AV			1.16 V	170	77.30	40.70
3	11570.00	63.2 PK	74.0	-10.8	1.21 V	204	44.40	18.80
4	11570.00	49.2 AV	54.0	-4.8	1.21 V	204	30.40	18.80

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	113.0 PK			1.00 H	128	72.30	40.70
2	*5825.00	103.3 AV			1.00 H	128	62.60	40.70
3	#5850.00	73.6 PK	93.0	-19.4	1.00 H	128	66.60	7.00
4	#5850.00	63.9 AV	83.3	-19.4	1.00 H	128	56.90	7.00
5	11650.00	60.8 PK	74.0	-13.2	1.00 H	126	41.60	19.20
6	11650.00	47.9 AV	54.0	-6.1	1.00 H	126	28.70	19.20
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	124.5 PK			1.00 V	209	83.80	40.70
2	*5825.00	115.2 AV			1.00 V	209	74.50	40.70
3	#5850.00	80.0 PK	104.5	-24.5	1.00 V	209	73.00	7.00
4	#5850.00	70.7 AV	95.2	-24.5	1.00 V	209	63.70	7.00
5	11650.00	61.6 PK	74.0	-12.4	1.02 V	196	42.40	19.20
6	11650.00	49.3 AV	54.0	-4.7	1.02 V	196	30.10	19.20

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 radiated frequency is out of the restricted band.
7. The limit value is defined as per 15.247.

802.11n (HT20)

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

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	#5725.00	81.9 PK	93.2	-11.3	1.18 H	118	74.80	7.10
2	#5725.00	71.3 AV	82.6	-11.3	1.18 H	118	64.20	7.10
3	*5745.00	113.2 PK			1.18 H	118	72.60	40.60
4	*5745.00	102.6 AV			1.18 H	118	62.00	40.60
5	11490.00	59.5 PK	74.0	-14.5	1.02 H	211	40.80	18.70
6	11490.00	48.1 AV	54.0	-5.9	1.02 H	211	29.40	18.70
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	#5725.00	94.7 PK	104.9	-10.2	1.17 V	169	87.60	7.10
2	#5725.00	84.9 AV	95.1	-10.2	1.17 V	169	77.80	7.10
3	*5745.00	124.9 PK			1.17 V	169	84.30	40.60
4	*5745.00	115.1 AV			1.17 V	169	74.50	40.60
5	11490.00	62.8 PK	74.0	-11.2	1.31 V	211	44.10	18.70
6	11490.00	50.9 AV	54.0	-3.1	1.31 V	211	32.20	18.70

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 radiated frequency is out of the restricted band.
7. The limit value is defined as per 15.247.

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	113.0 PK			1.00 H	120	72.30	40.70
2	*5785.00	103.5 AV			1.00 H	120	62.80	40.70
3	11570.00	61.4 PK	74.0	-12.6	1.00 H	176	42.60	18.80
4	11570.00	48.5 AV	54.0	-5.5	1.00 H	176	29.70	18.80
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	125.7 PK			1.26 V	170	85.00	40.70
2	*5785.00	116.0 AV			1.26 V	170	75.30	40.70
3	11570.00	61.6 PK	74.0	-12.4	1.67 V	154	42.80	18.80
4	11570.00	49.1 AV	54.0	-4.9	1.67 V	154	30.30	18.80

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	113.3 PK			1.16 H	118	72.60	40.70
2	*5825.00	103.5 AV			1.16 H	118	62.80	40.70
3	#5850.00	74.0 PK	93.3	-19.3	1.16 H	119	67.00	7.00
4	#5850.00	64.2 AV	83.5	-19.3	1.16 H	119	57.20	7.00
5	11650.00	60.3 PK	74.0	-13.7	1.30 H	159	41.10	19.20
6	11650.00	47.7 AV	54.0	-6.3	1.30 H	159	28.50	19.20
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	125.3 PK			1.06 V	163	84.60	40.70
2	*5825.00	115.4 AV			1.06 V	163	74.70	40.70
3	#5850.00	88.8 PK	105.3	-16.5	1.06 V	163	81.80	7.00
4	#5850.00	78.9 AV	95.4	-16.5	1.06 V	163	71.90	7.00
5	11650.00	60.1 PK	74.0	-13.9	1.22 V	216	40.90	19.20
6	11650.00	48.3 AV	54.0	-5.7	1.22 V	216	29.10	19.20

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 radiated frequency is out of the restricted band.
7. The limit value is defined as per 15.247.

802.11n (HT40)

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

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	#5725.00	76.2 PK	89.8	-13.6	1.16 H	118	69.10	7.10
2	#5725.00	65.8 AV	79.4	-13.6	1.16 H	118	58.70	7.10
3	*5755.00	109.8 PK			1.16 H	118	69.10	40.70
4	*5755.00	99.4 AV			1.16 H	118	58.70	40.70
5	11510.00	43.1 PK	74.0	-30.9	1.42 H	223	24.40	18.70
6	11510.00	30.2 AV	54.0	-23.8	1.42 H	223	11.50	18.70
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	#5725.00	91.2 PK	101.4	-10.2	1.18 V	172	84.10	7.10
2	#5725.00	81.3 AV	91.6	-10.3	1.18 V	172	74.20	7.10
3	*5755.00	121.4 PK			1.18 V	172	80.70	40.70
4	*5755.00	111.6 AV			1.18 V	172	70.90	40.70
5	11510.00	62.0 PK	74.0	-12.0	1.27 V	205	43.30	18.70
6	11510.00	48.5 AV	54.0	-5.5	1.27 V	205	29.80	18.70

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 radiated frequency is out of the restricted band.
7. The limit value is defined as per 15.247.

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	112.8 PK			1.17 H	120	72.10	40.70
2	*5795.00	101.8 AV			1.17 H	120	61.10	40.70
3	#5850.00	72.7 PK	92.8	-20.1	1.17 H	120	65.70	7.00
4	#5850.00	61.7 AV	81.8	-20.1	1.17 H	120	54.70	7.00
5	11590.00	61.0 PK	74.0	-13.0	1.24 H	114	42.10	18.90
6	11590.00	47.4 AV	54.0	-6.6	1.24 H	114	28.50	18.90
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	123.4 PK			1.16 V	174	82.70	40.70
2	*5795.00	113.3 AV			1.16 V	174	72.60	40.70
3	#5850.00	84.9 PK	103.4	-18.5	1.16 V	174	77.90	7.00
4	#5850.00	74.8 AV	93.3	-18.5	1.16 V	174	67.80	7.00
5	11590.00	61.2 PK	74.0	-12.8	1.17 V	241	42.30	18.90
6	11590.00	48.4 AV	54.0	-5.6	1.17 V	241	29.50	18.90

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 radiated frequency is out of the restricted band.
7. The limit value is defined as per 15.247.

802.11ac (VHT80)

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

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	#5725.00	74.3 PK	84.5	-10.2	1.28 H	117	67.20	7.10
2	#5725.00	64.4 AV	74.6	-10.2	1.28 H	117	57.30	7.10
3	*5775.00	104.5 PK			1.28 H	117	63.80	40.70
4	*5775.00	94.6 AV			1.28 H	117	53.90	40.70
5	#5850.00	70.3 PK	84.5	-14.2	1.28 H	117	63.30	7.00
6	#5850.00	60.4 AV	74.6	-14.2	1.28 H	117	53.40	7.00
7	11550.00	61.9 PK	74.0	-12.1	1.16 H	241	43.20	18.70
8	11550.00	48.5 AV	54.0	-5.5	1.16 H	241	29.80	18.70
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	#5725.00	85.6 PK	96.6	-11.0	1.27 V	174	78.50	7.10
2	#5725.00	75.4 AV	86.4	-11.0	1.27 V	174	68.30	7.10
3	*5775.00	116.6 PK			1.27 V	174	75.90	40.70
4	*5775.00	106.4 AV			1.27 V	174	65.70	40.70
5	#5850.00	81.6 PK	96.6	-15.0	1.27 V	174	74.60	7.00
6	#5850.00	71.4 AV	86.4	-15.0	1.27 V	174	64.40	7.00
7	11550.00	60.8 PK	74.0	-13.2	1.06 V	219	42.10	18.70
8	11550.00	48.8 AV	54.0	-5.2	1.06 V	219	30.10	18.70

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 radiated frequency is out of the restricted band.
7. The limit value is defined as per 15.247.

BELOW 1GHz WORST-CASE DATA：802.11a

CHANNEL	TX Channel 149	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 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	57.12	32.0 QP	40.0	-8.0	2.00 H	10	46.70	-14.70
2	166.00	33.6 QP	43.5	-9.9	1.49 H	254	47.70	-14.10
3	500.42	34.4 QP	46.0	-11.6	1.49 H	352	42.80	-8.40
4	834.84	34.2 QP	46.0	-11.8	1.49 H	18	36.00	-1.80
5	960.00	44.4 QP	46.0	-1.6	1.49 H	98	43.90	0.50
6	1000.00	37.6 QP	54.0	-16.4	1.49 H	98	36.80	0.80
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	29.90	36.5 QP	40.0	-3.5	1.00 V	236	52.50	-16.00
2	57.12	31.7 QP	40.0	-8.3	1.00 V	16	46.40	-14.70
3	138.78	28.3 QP	43.5	-15.2	1.00 V	132	42.90	-14.60
4	500.42	32.4 QP	46.0	-13.6	1.00 V	156	40.80	-8.40
5	960.00	44.4 QP	46.0	-1.6	1.00 V	98	43.90	0.50
6	1000.00	38.4 QP	54.0	-15.6	1.00 V	226	37.60	0.80

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

5.2 CONDUCTED EMISSION MEASUREMENT

5.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	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 0.50MHz.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

5.2.2 TEST INSTRUMENTS

Same as item 4.2.2.

5.2.3 TEST PROCEDURES

Same as item 4.2.3.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation.

5.2.5 TEST SETUP

Same as item 4.2.5.

5.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.

5.2.7 TEST RESULTS

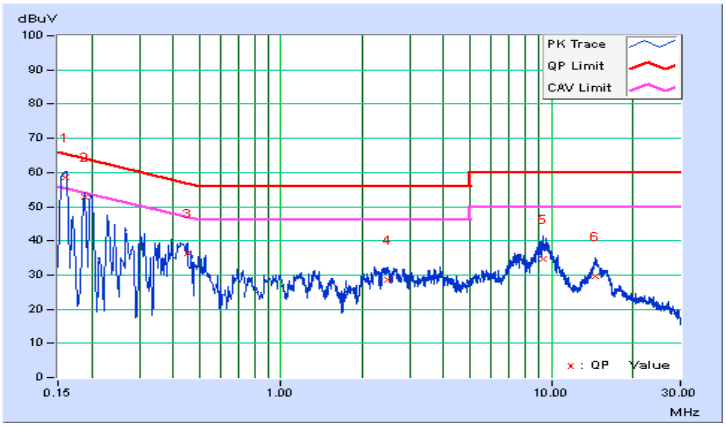
CONDUCTED WORST-CASE DATA：802.11a

PHASE	Line 1	6dB BANDWIDTH	9kHz

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.16059**	**0.08**	**58.45**	**42.24**	**58.53**	**42.32**	**65.43**	**55.43**	**-6.91**	**-13.12**
2	0.18852	0.07	52.87	34.88	52.94	34.95	64.10	54.10	-11.16	-19.15
3	0.45091	0.08	36.33	24.36	36.41	24.44	56.86	46.86	-20.45	-22.42
4	2.49625	0.17	28.47	19.44	28.64	19.61	56.00	46.00	-27.36	-26.39
5	9.37737	0.48	34.29	25.13	34.77	25.61	60.00	50.00	-25.23	-24.39
6	14.48724	0.75	28.74	23.33	29.49	24.08	60.00	50.00	-30.51	-25.92

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.

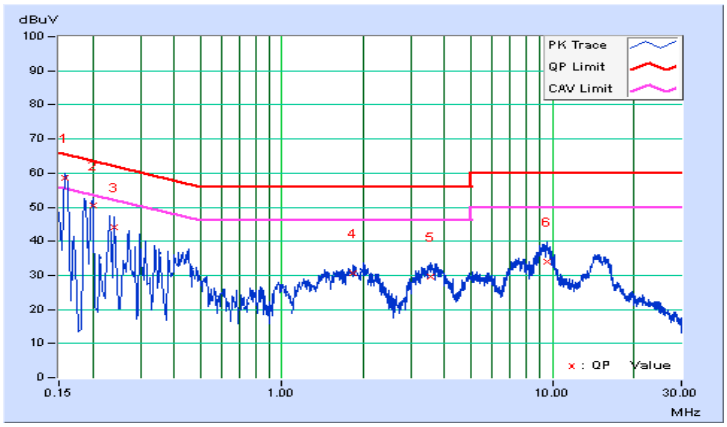


PHASE	Line 2	6dB BANDWIDTH	9kHz

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15825	0.05	58.47	43.17	58.52	43.22	65.56	55.56	-7.04	-12.34
2	0.20047	0.05	50.55	35.36	50.60	35.41	63.59	53.59	-12.99	-18.18
3	0.23914	0.05	44.13	29.23	44.18	29.28	62.13	52.13	-17.94	-22.84
4	1.82729	0.13	30.58	22.28	30.71	22.41	56.00	46.00	-25.29	-23.59
5	3.54037	0.19	29.28	22.98	29.47	23.17	56.00	46.00	-26.53	-22.83
6	9.53314	0.42	33.63	23.88	34.05	24.30	60.00	50.00	-25.95	-25.70

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.



5.3 6dB BANDWIDTH MEASUREMENT

5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

5.3.2 TEST SETUP

Same as item 4.3.2.

5.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.3.4 TEST PROCEDURE

Same as item 4.3.4.

5.3.5 DEVIATION FROM TEST STANDARD

No deviation.

5.3.6 EUT OPERATING CONDITIONS

Same as item 4.3.6.

5.3.7 TEST RESULTS

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	16.39	16.39	16.42	0.5	PASS
157	5785	16.39	16.40	16.43	0.5	PASS
165	5825	16.38	16.40	16.44	0.5	PASS

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.66	17.67	17.66	0.5	PASS
157	5785	17.60	17.65	17.66	0.5	PASS
165	5825	17.63	17.64	17.66	0.5	PASS

802.11n (HT40)

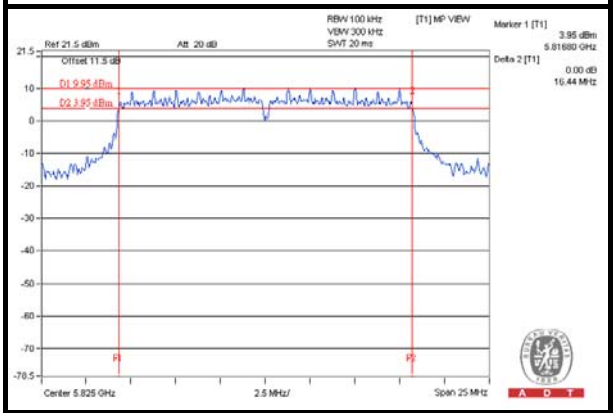
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	36.47	36.48	36.48	0.5	PASS
159	5795	36.42	36.42	36.47	0.5	PASS

802.11ac (VHT80)

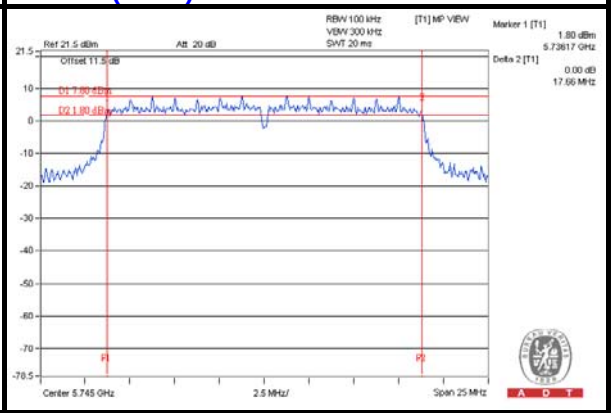
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
155	5775	76.44	76.51	76.60	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

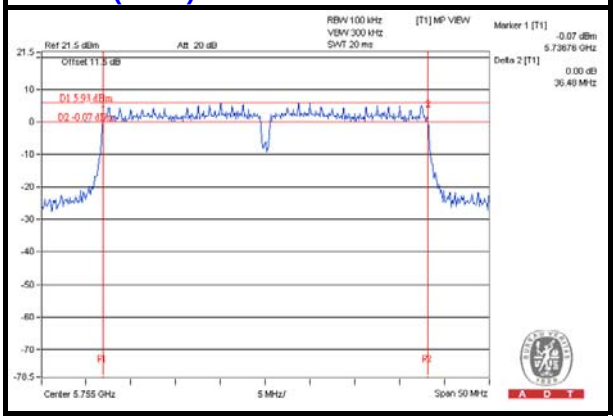
802.11a



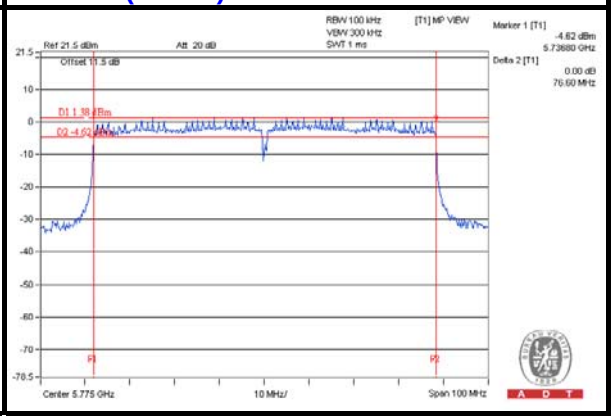
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)



5.4 CONDUCTED OUTPUT POWER

5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

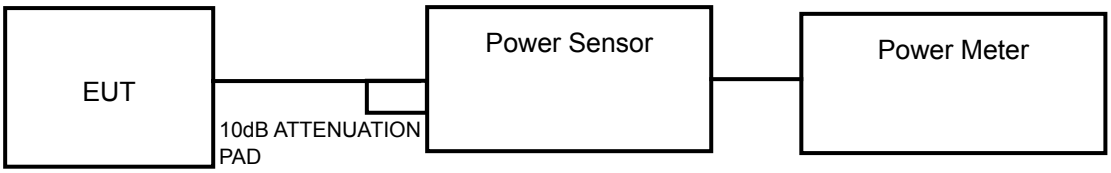
Per KDB 662911 D01 Multiple Transmitter Output v02r01 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 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 ≥ 5.

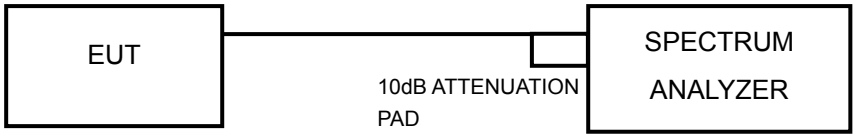
For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

5.4.2 TEST SETUP

For 802.11a, 802.11n (HT20), 802.11n (HT40)



For 802.11ac (VHT80)



5.4.3 INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.4.4 TEST PROCEDURES

For 802.11a, 802.11n (HT20), 802.11n (HT40)

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.

For 802.11ac (VHT80)

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

1) Set the RBW = 1 MHz.
2) Set the VBW ≥ 3 RBW.
3) Set the span ≥ 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 instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

5.4.5 DEVIATION FROM TEST STANDARD

No deviation.

5.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

5.4.7 TEST RESULTS

FOR AVERAGE POWER

802.11a

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	22.61	22.91	22.41	552.005	27.42	30	PASS
157	5785	22.92	22.68	22.28	550.281	27.41	30	PASS
165	5825	22.93	22.69	22.01	540.971	27.33	30	PASS

802.11n (HT20)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	21.61	21.65	21.21	423.225	26.27	30	PASS
157	5785	22.81	22.79	22.08	542.529	27.34	30	PASS
165	5825	22.96	22.71	22.14	548.017	27.39	30	PASS

802.11n (HT40)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
151	5755	20.80	20.50	20.26	338.598	25.30	30	PASS
159	5795	22.95	22.82	22.31	**558.884**	27.47	30	PASS

802.11ac (VHT80)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
155	5775	19.30	19.45	19.12	254.877	24.06	30	PASS

5.5 POWER SPECTRAL DENSITY MEASUREMENT

5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.5.2 TEST SETUP

Same as item 4.5.2.

5.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.5.4 TEST PROCEDURE.

Same as item 4.5.4.

5.5.5 DEVIATION FROM TEST STANDARD

No deviation.

5.5.6 EUT OPERATING CONDITION

Same as item 4.3.6.

5.5.7 TEST RESULTS

802.11a

TX chain	Chan.	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD without Duty Factor (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	149	5745	-9.04	4.77	-4.27	0.09	-4.18	7.73	PASS
	157	5785	-9.30	4.77	-4.53	0.09	-4.44	7.73	PASS
	165	5825	-8.25	4.77	-3.48	0.09	-3.39	7.73	PASS
1	149	5745	-8.13	4.77	-3.36	0.09	-3.27	7.73	PASS
	157	5785	-8.15	4.77	-3.38	0.09	-3.29	7.73	PASS
	165	5825	-8.49	4.77	-3.72	0.09	-3.63	7.73	PASS
2	149	5745	-7.60	4.77	-2.83	0.09	-2.74	7.73	PASS
	157	5785	-7.69	4.77	-2.92	0.09	-2.83	7.73	PASS
	165	5825	-7.81	4.77	-3.04	0.09	-2.95	7.73	PASS

NOTE:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 1.5dBi + 10log(3) = 6.27dBi > 6dBi, so the power density limit shall be reduced to 8-(6.27-6) = 7.73dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX chain	Chan.	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD without Duty Factor (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	149	5745	-11.70	4.77	-6.93	0.09	-6.84	7.73	PASS
	157	5785	-10.43	4.77	-5.66	0.09	-5.57	7.73	PASS
	165	5825	-10.93	4.77	-6.16	0.09	-6.07	7.73	PASS
1	149	5745	-9.54	4.77	-4.77	0.09	-4.68	7.73	PASS
	157	5785	-9.16	4.77	-4.39	0.09	-4.30	7.73	PASS
	165	5825	-9.21	4.77	-4.44	0.09	-4.35	7.73	PASS
2	149	5745	-9.92	4.77	-5.15	0.09	-5.06	7.73	PASS
	157	5785	-9.88	4.77	-5.11	0.09	-5.02	7.73	PASS
	165	5825	-10.11	4.77	-5.34	0.09	-5.25	7.73	PASS

NOTE:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 1.5dBi + 10log(3) = 6.27dBi > 6dBi, so the power density limit shall be reduced to 8-(6.27-6) = 7.73dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

TX chain	Chan.	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD without Duty Factor (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	151	5755	-15.12	4.77	-10.35	0.13	-10.22	7.73	PASS
	159	5795	-13.41	4.77	-8.64	0.13	-8.51	7.73	PASS
1	151	5755	-13.15	4.77	-8.38	0.13	-8.25	7.73	PASS
	159	5795	-11.21	4.77	-6.44	0.13	-6.31	7.73	PASS
2	151	5755	-12.68	4.77	-7.91	0.13	-7.78	7.73	PASS
	159	5795	-11.54	4.77	-6.77	0.13	-6.64	7.73	PASS

NOTE:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 1.5dBi + 10log(3) = 6.27dBi > 6dBi, so the power density limit shall be reduced to 8-(6.27-6) = 7.73dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

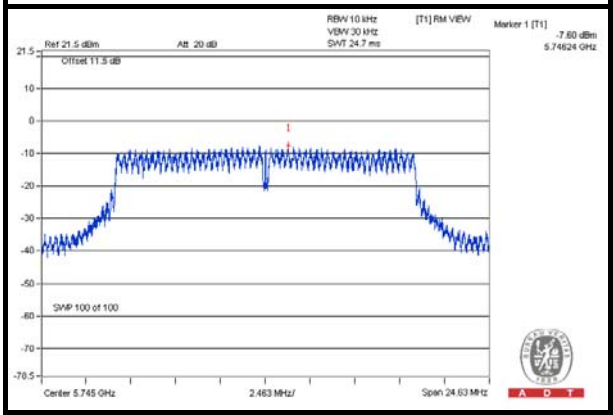
TX chain	Chan.	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD without Duty Factor (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	155	5775	-18.90	4.77	-14.13	0.36	-13.77	7.73	PASS
1	155	5775	-17.08	4.77	-12.31	0.36	-11.95	7.73	PASS
2	155	5775	-17.05	4.77	-12.28	0.36	-11.92	7.73	PASS

NOTE:

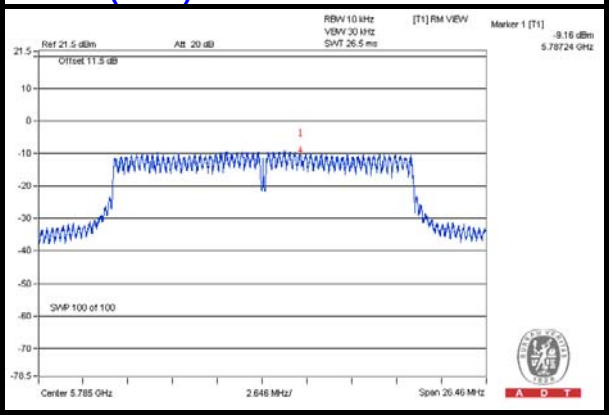
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 1.5dBi + 10log(3) = 6.27dBi > 6dBi, so the power density limit shall be reduced to 8-(6.27-6) = 7.73dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE

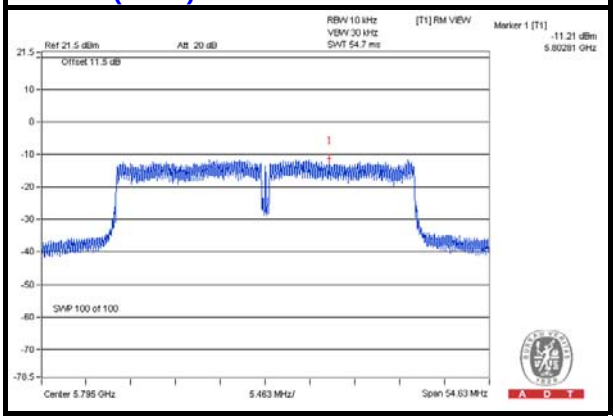
802.11a



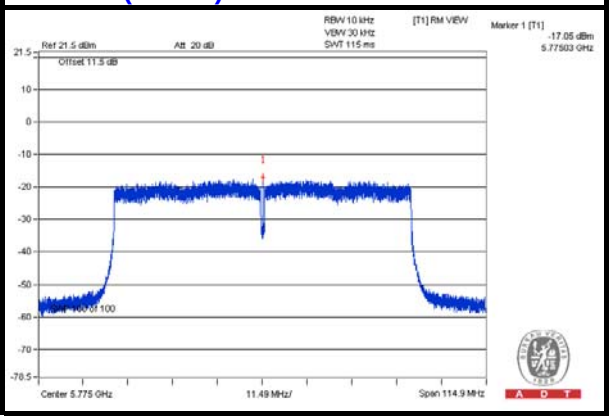
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)



5.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

5.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

Below –30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

5.6.2 TEST SETUP

Same as Item 4.6.2.

5.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.6.4 TEST PROCEDURE

Same as Item 4.6.4.

5.6.5 DEVIATION FROM TEST STANDARD

No deviation.

5.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6.

5.6.7 TEST RESULTS

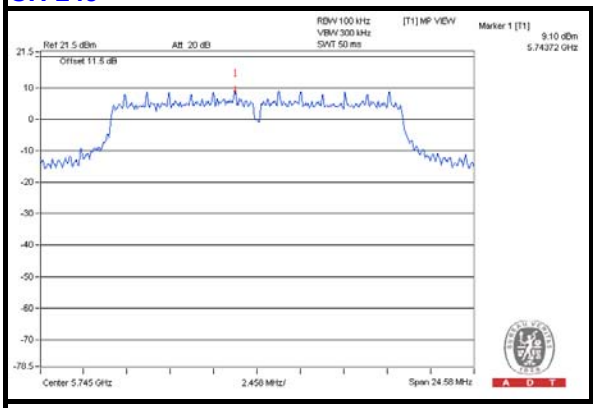
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

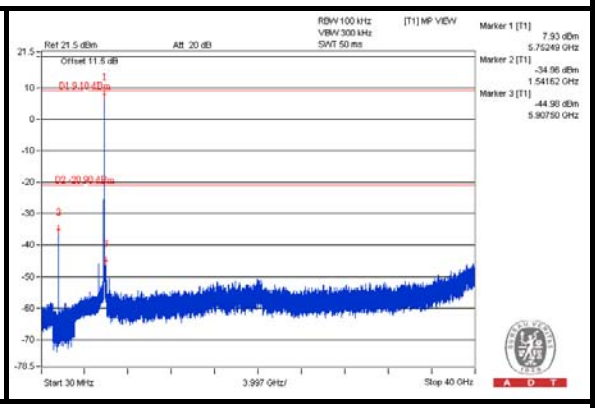
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11a

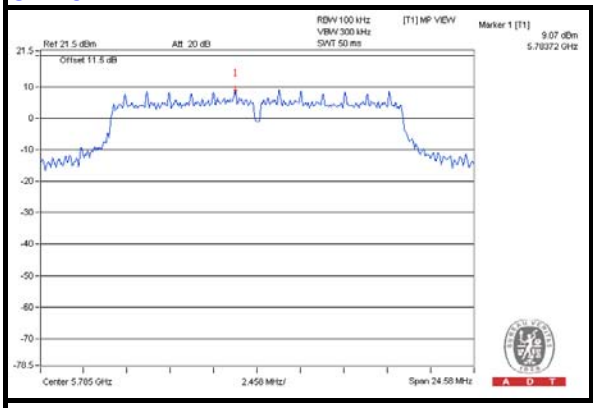
CHAIN 0

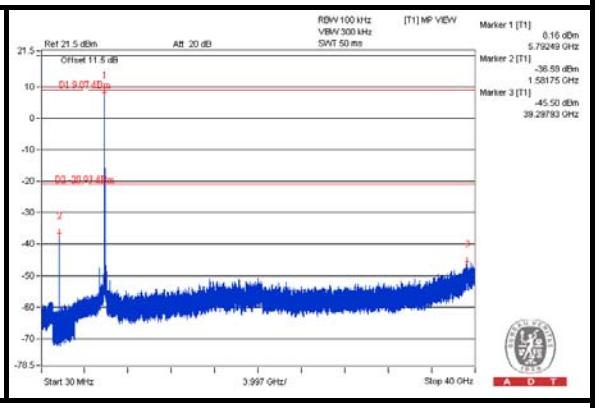
CH 149



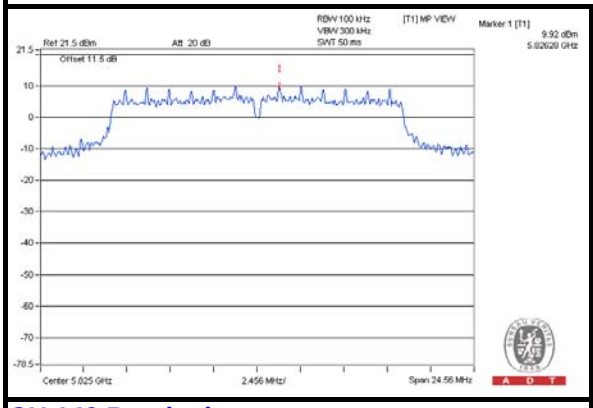


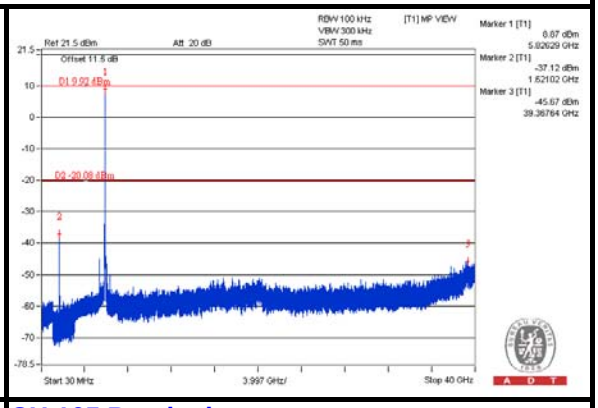
CH 157



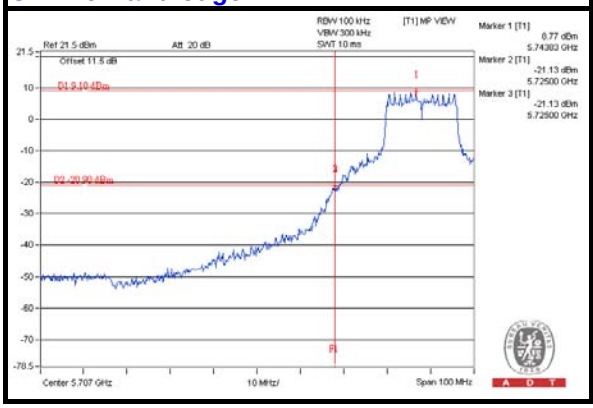


CH 165

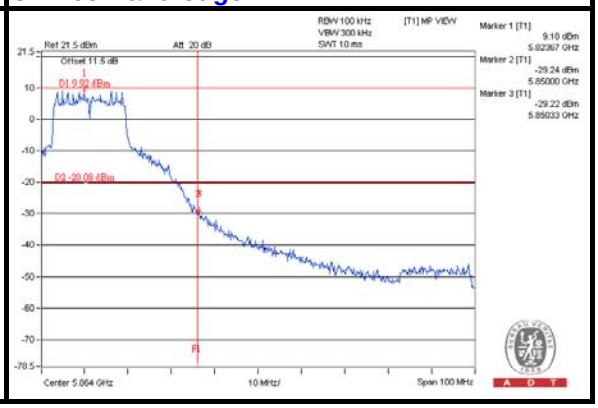




CH 149 Band edge

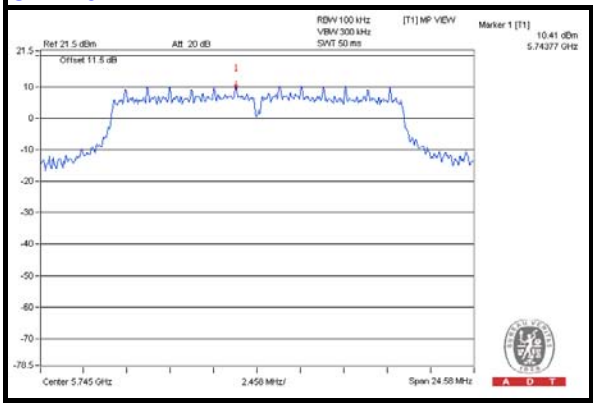


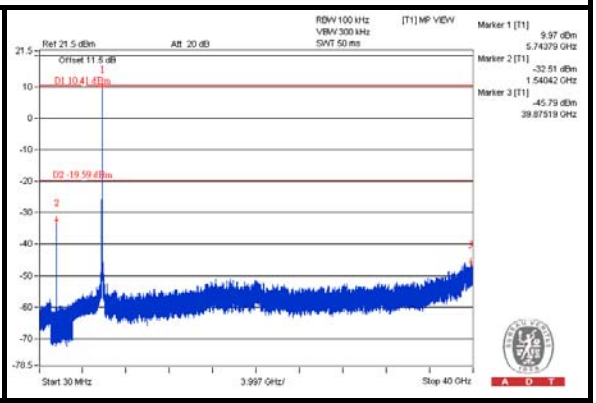
CH 165 Band edge



CHAIN 1

CH 149





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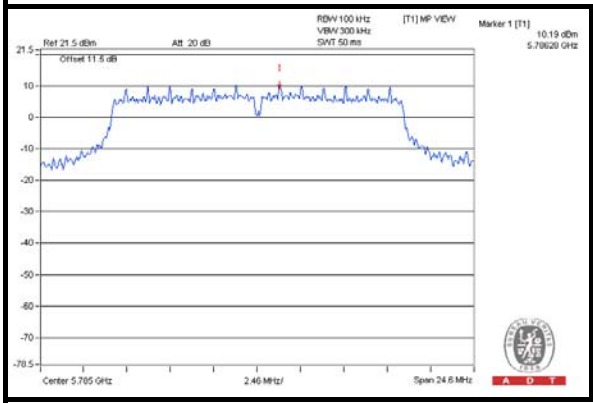
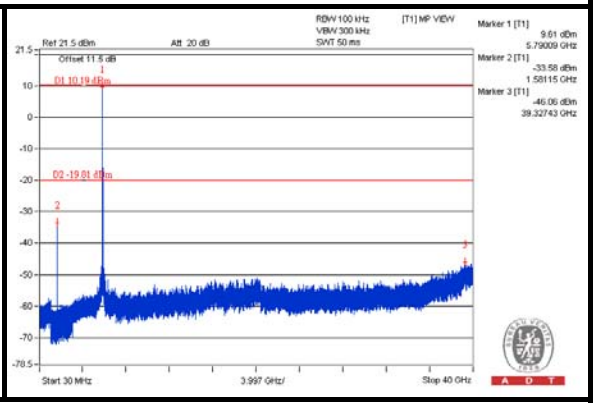
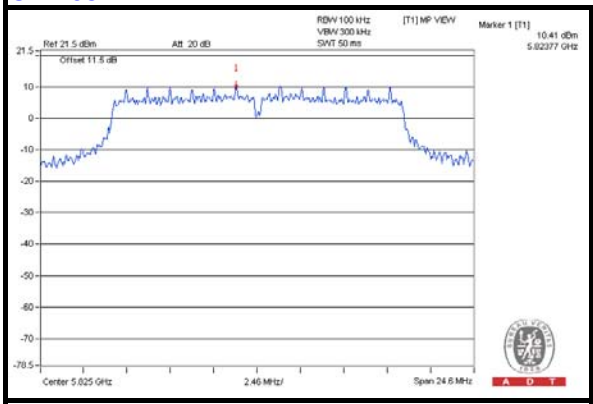
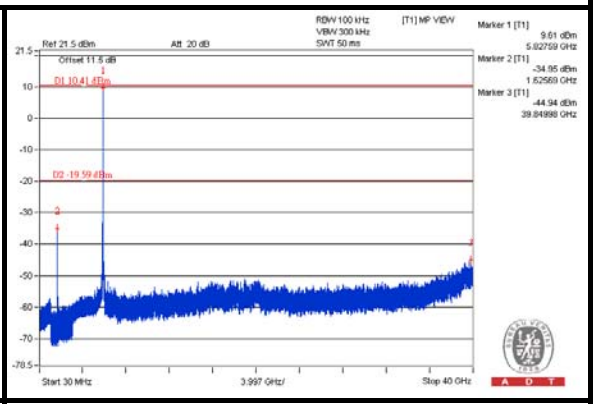


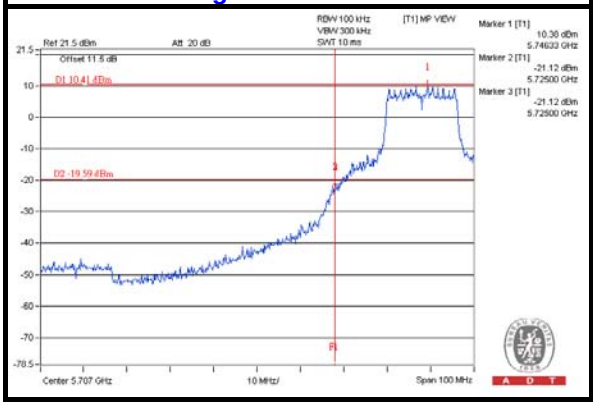


CH 165

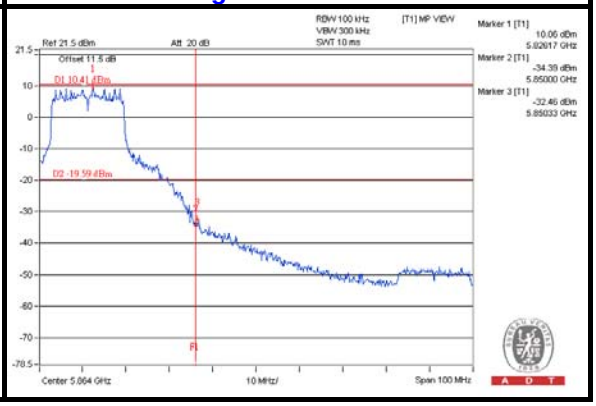




CH 149 Band edge

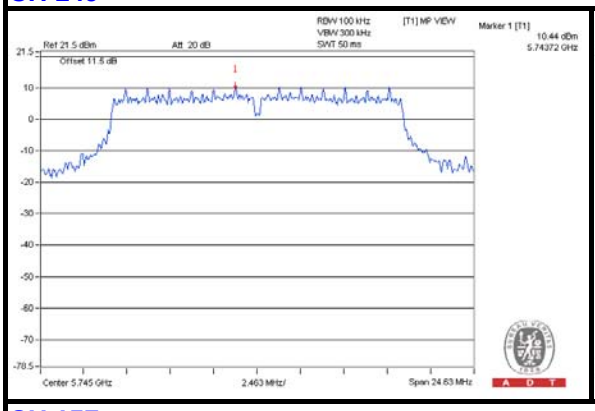


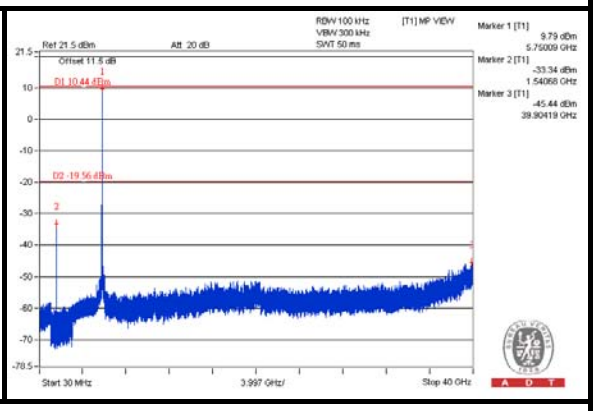
CH 165 Band edge



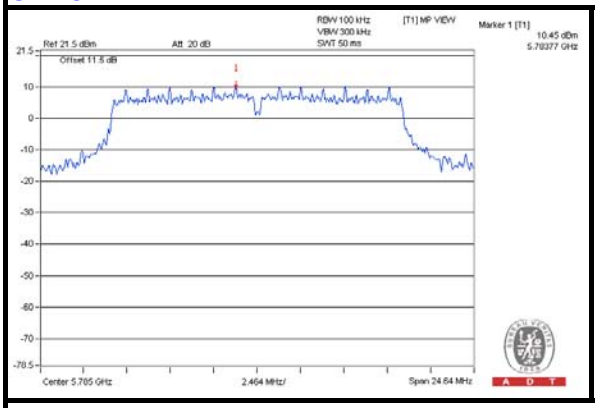
CHAIN 2

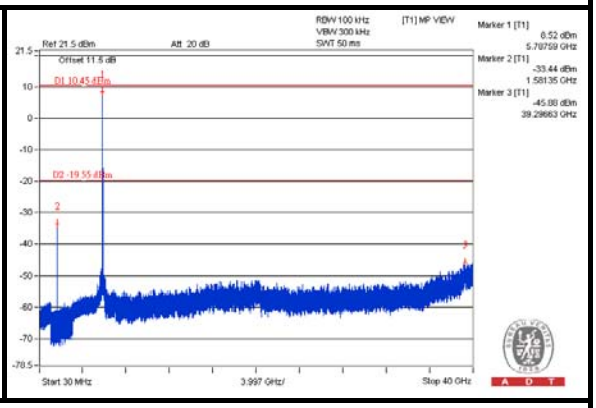
CH 149





CH 157





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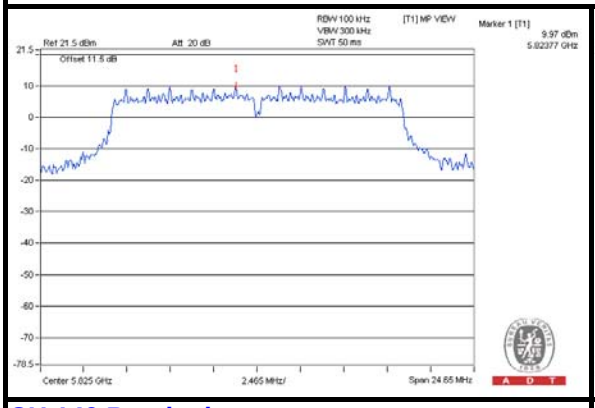
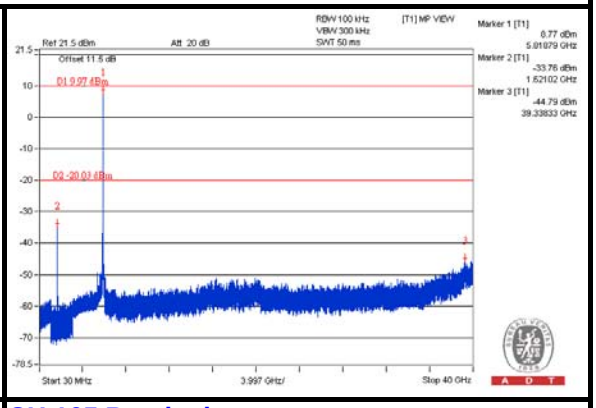
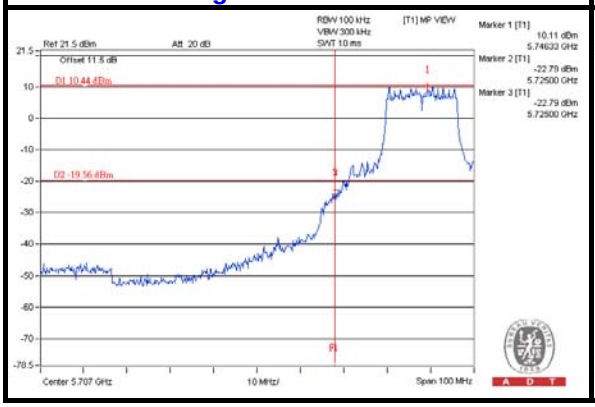
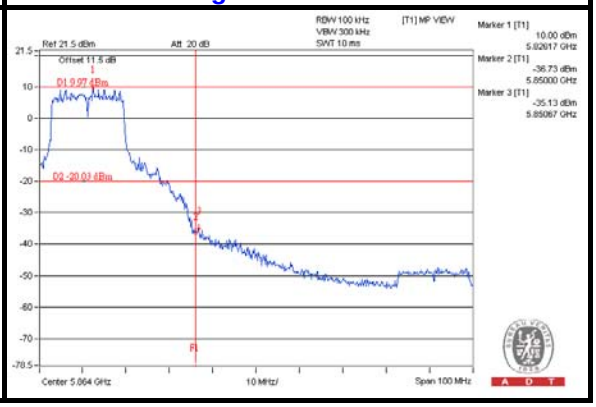




CH 149 Band edge

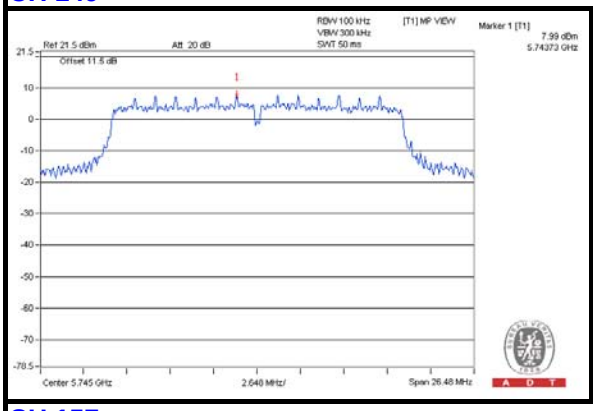


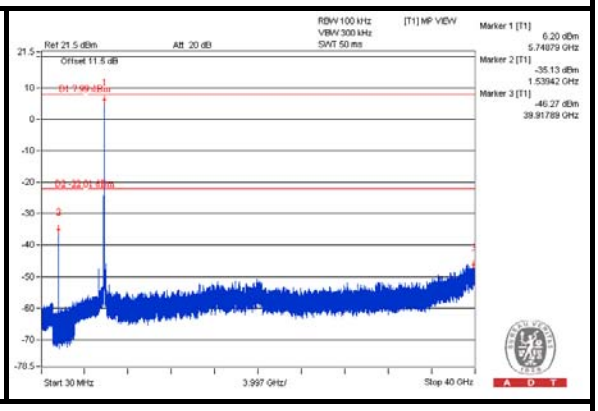
CH 165 Band edge



802.11n (HT20)
CHAIN 0

CH 149





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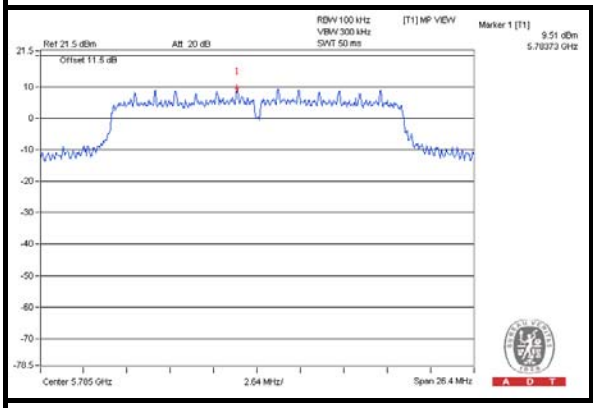

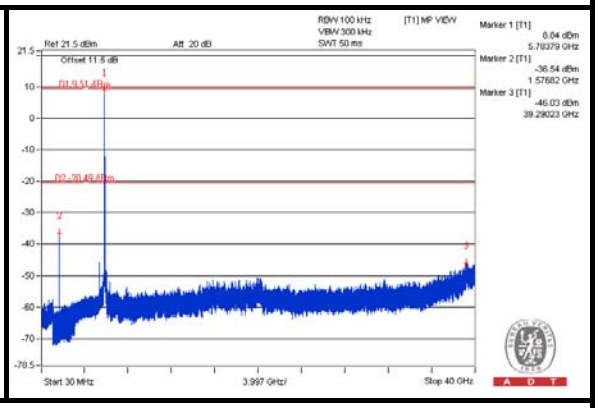

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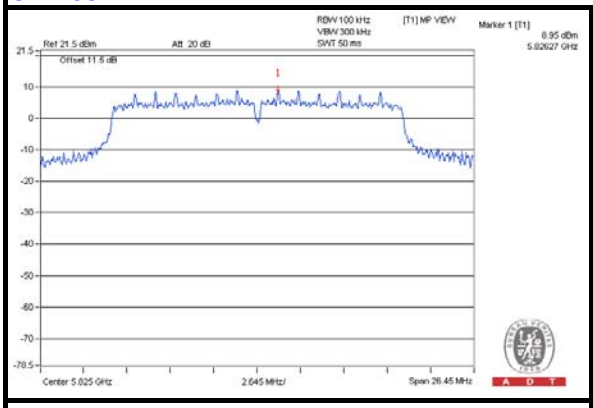
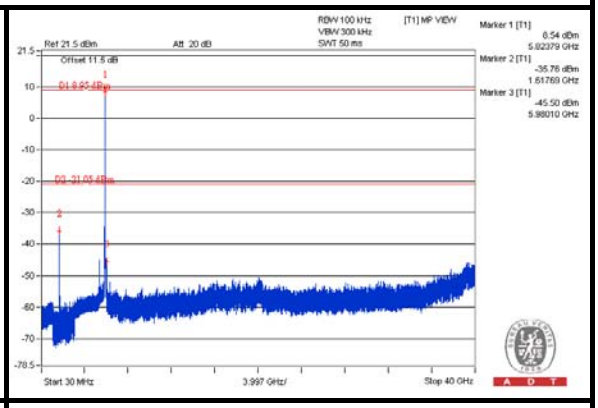
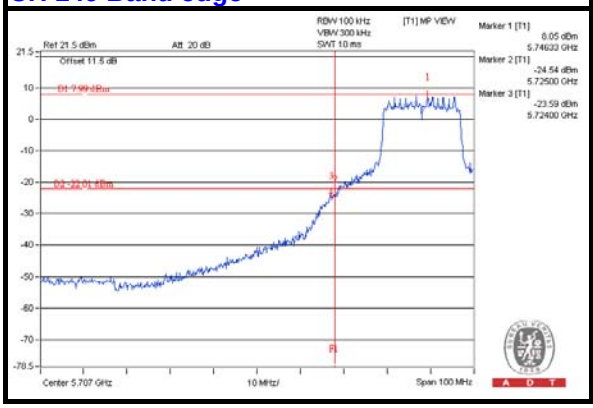
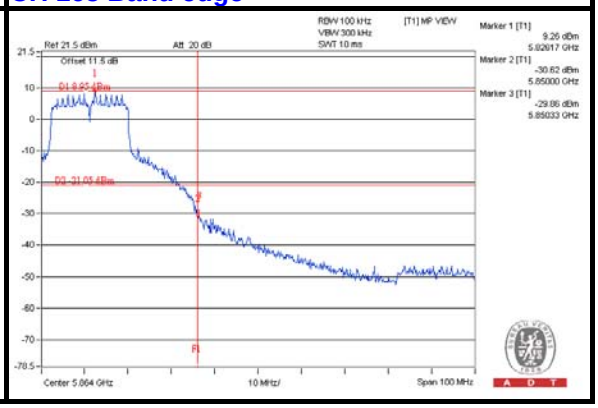




CH 149 Band edge

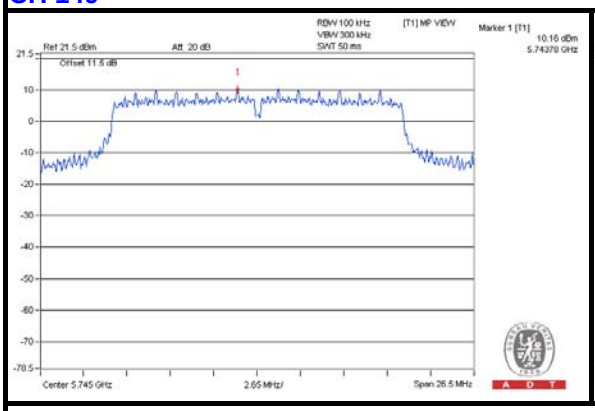


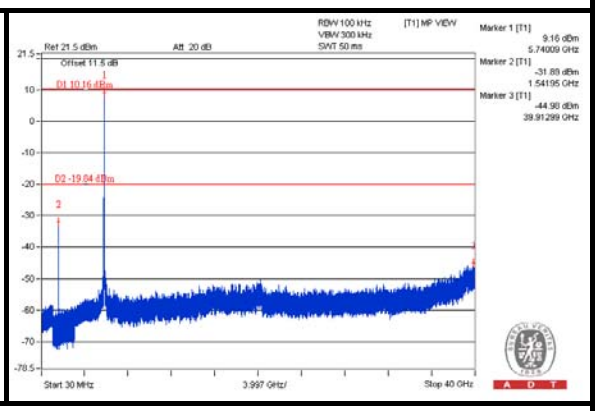
CH 165 Band edge



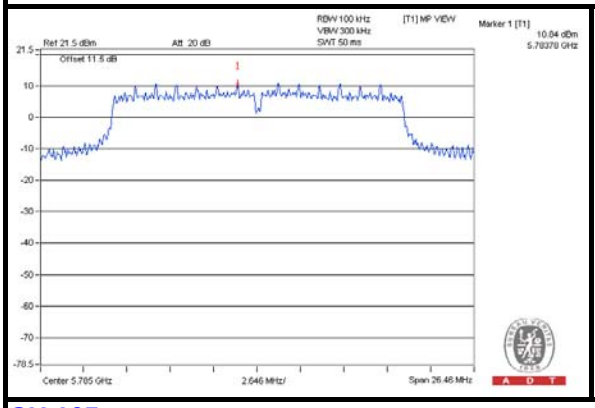
CHAIN 1

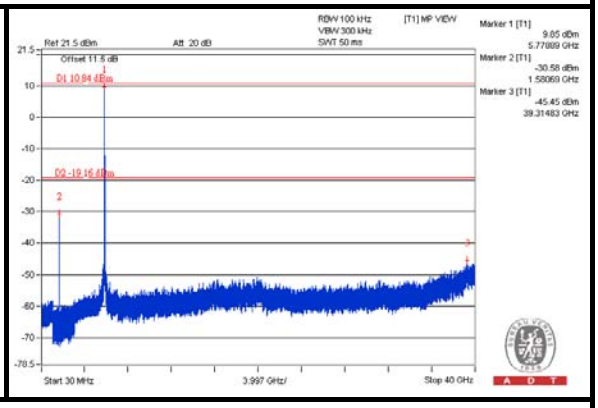
CH 149



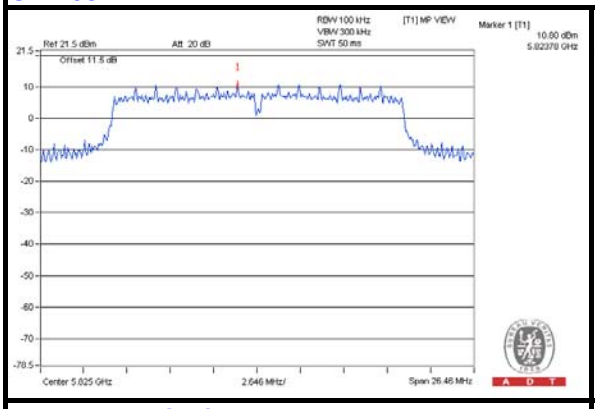


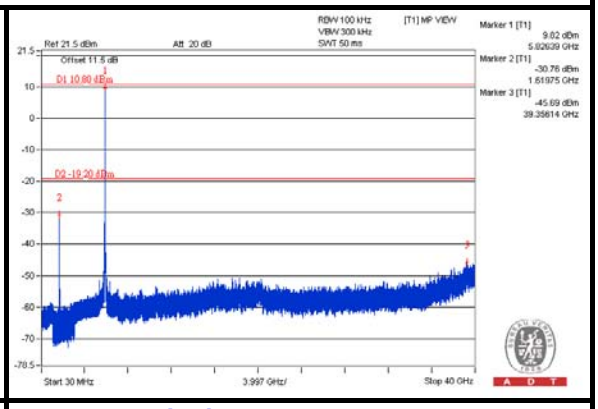
CH 157



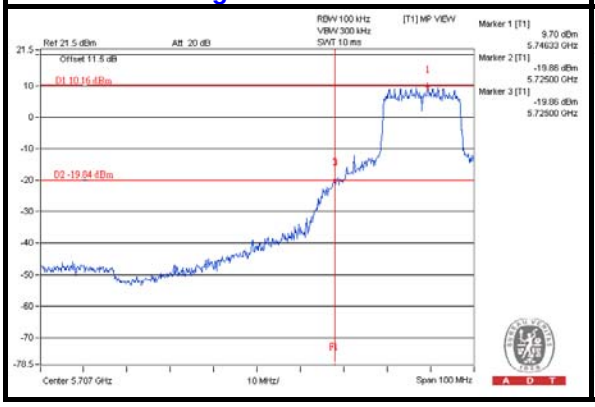


CH 165

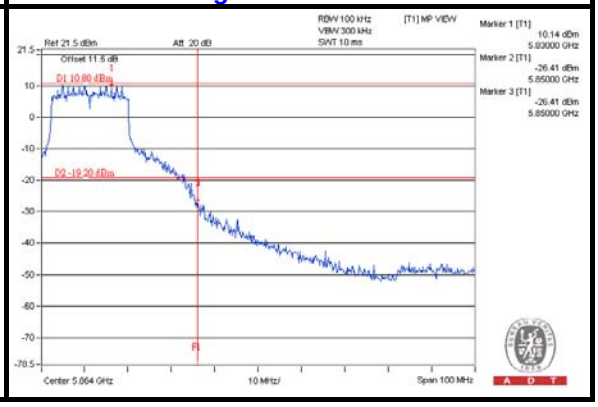




CH 149 Band edge

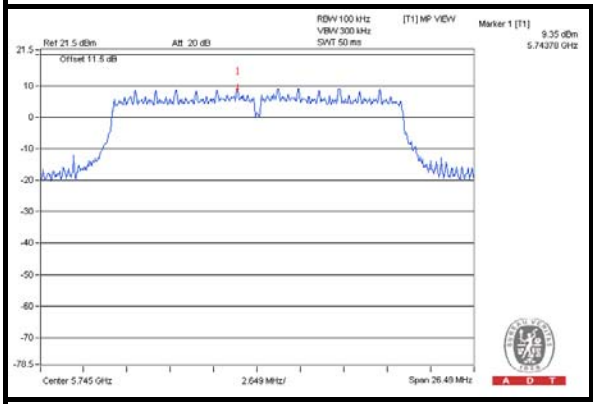


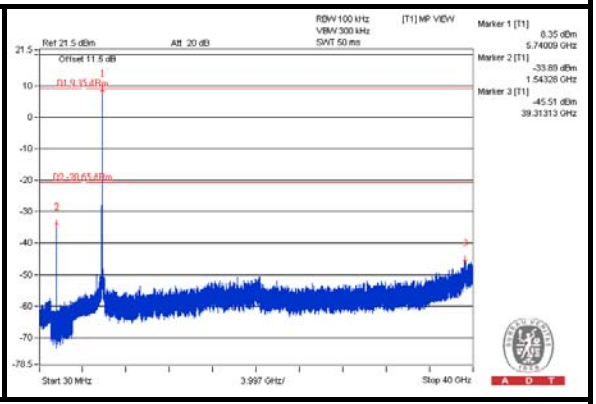
CH 165 Band edge



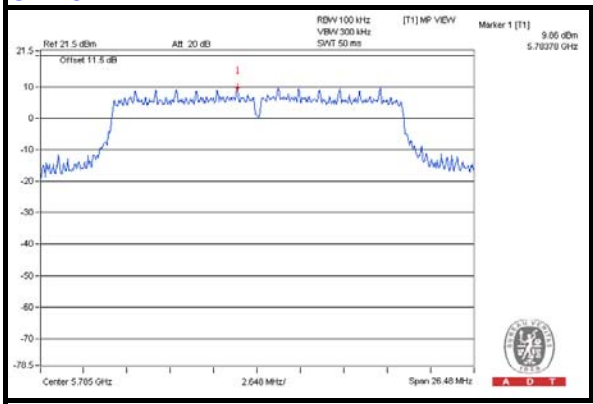
CHAIN 2

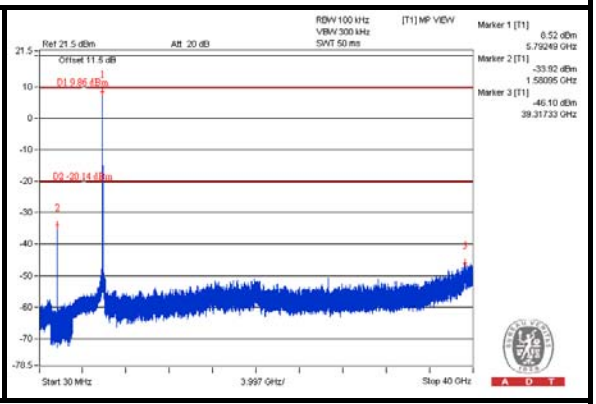
CH 149



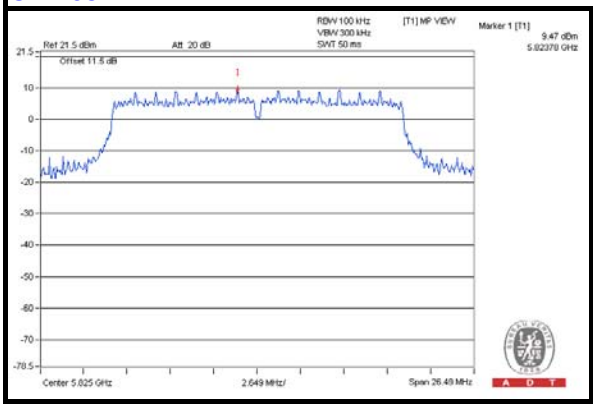


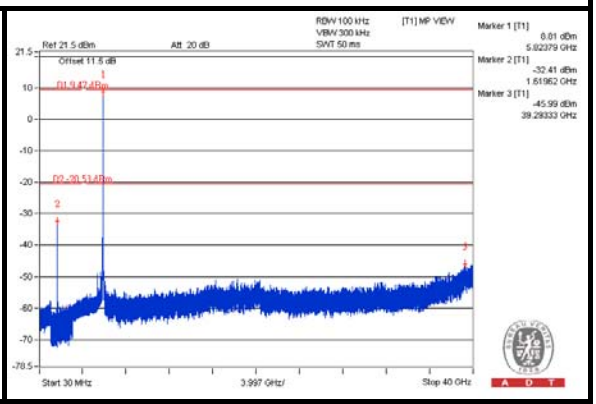
CH 157



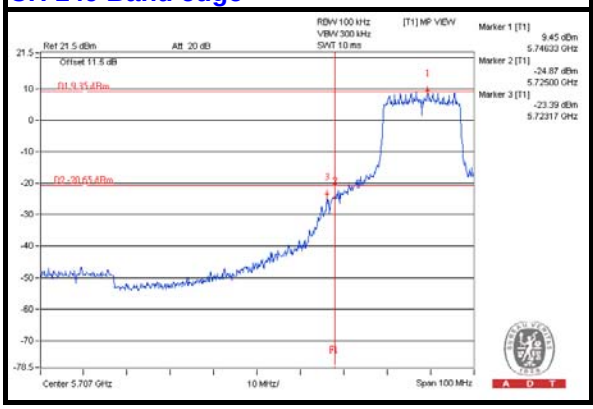


CH 165

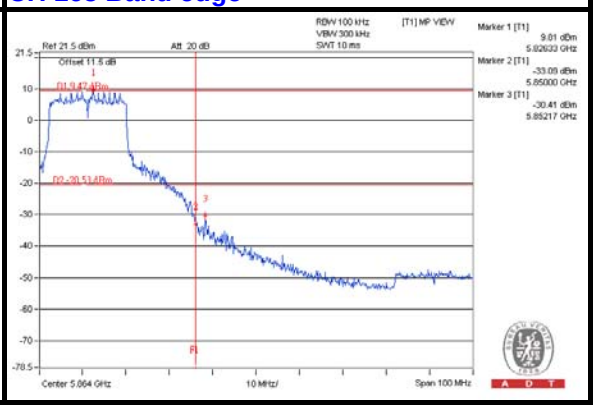




CH 149 Band edge

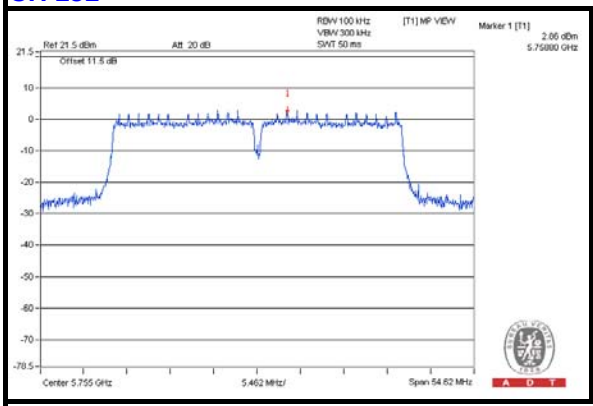


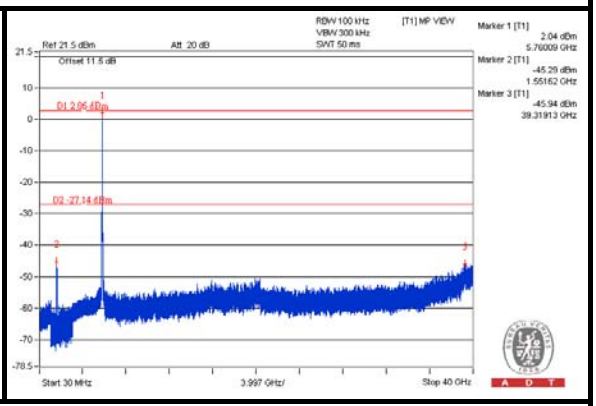
CH 165 Band edge



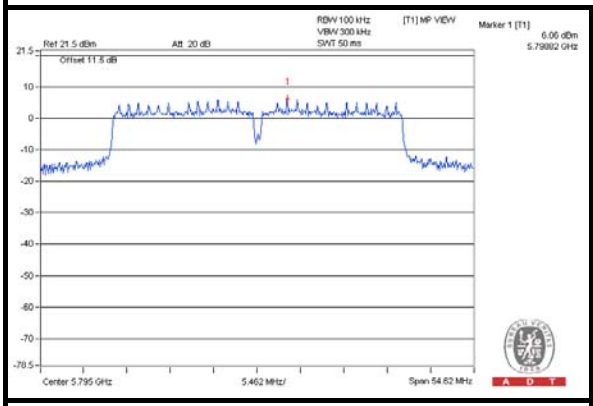
802.11n (HT40)
CHAIN 0

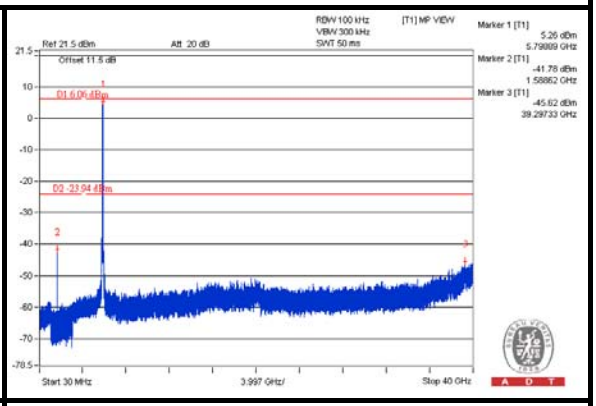
CH 151



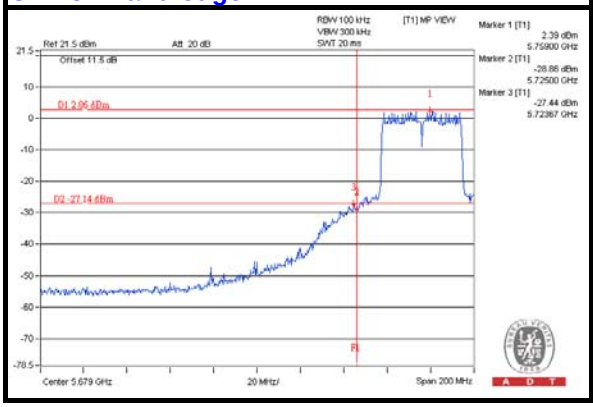


CH 159

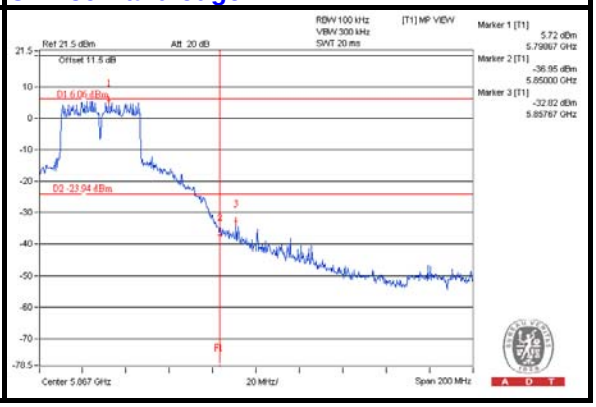




CH 151 Band edge

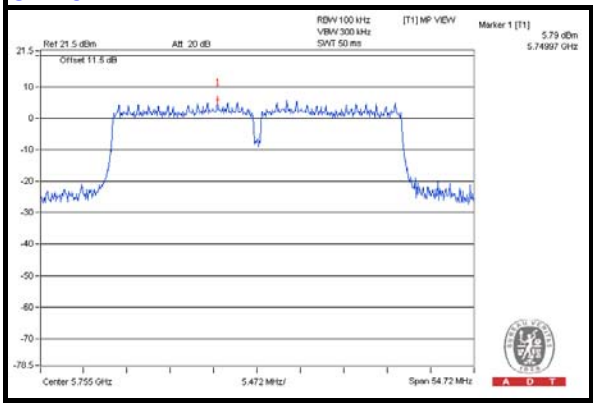


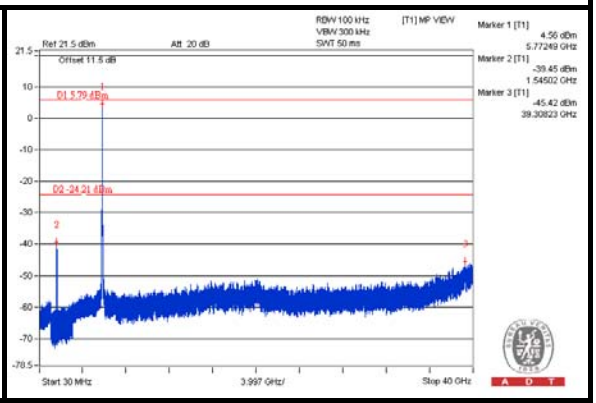
CH 159 Band edge



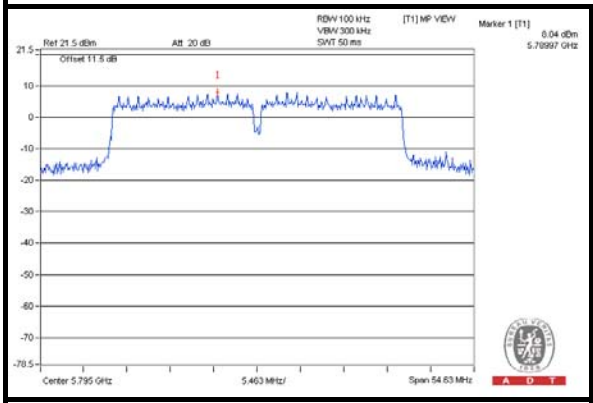
CHAIN 1

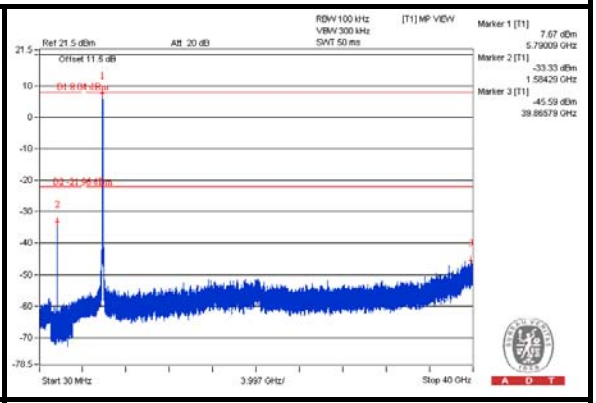
CH 151



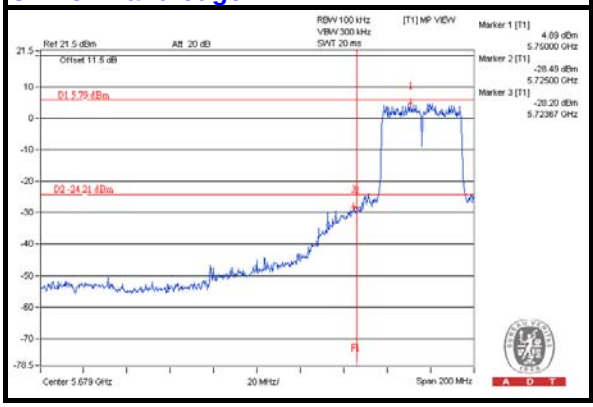


CH 159

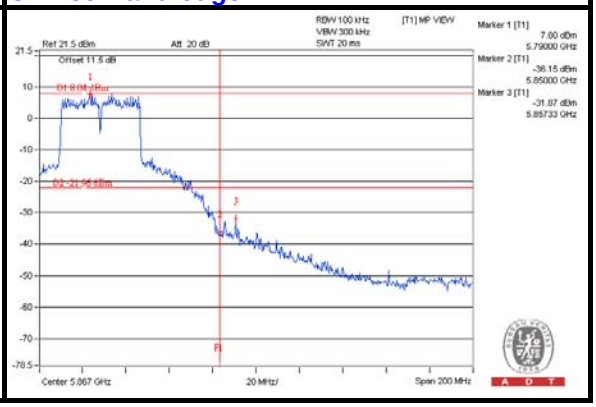




CH 151 Band edge

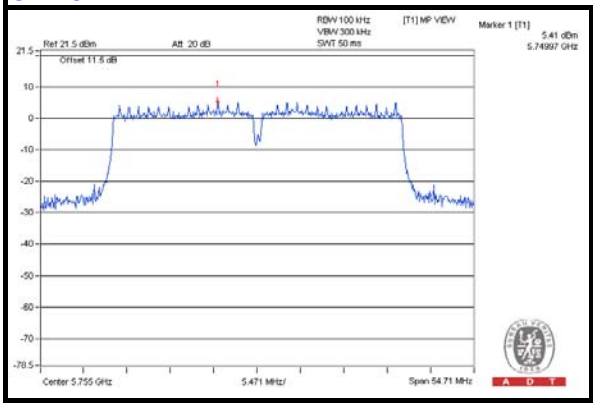


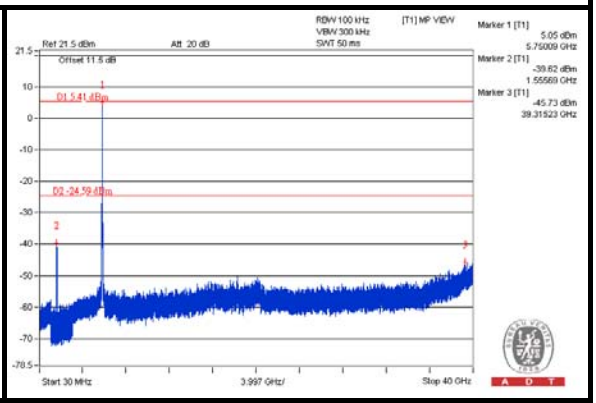
CH 159 Band edge



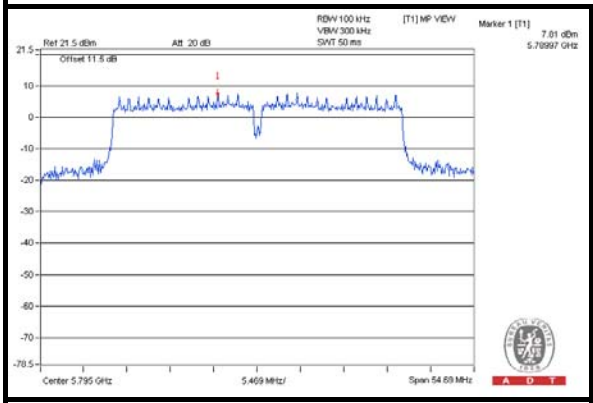
CHAIN 2

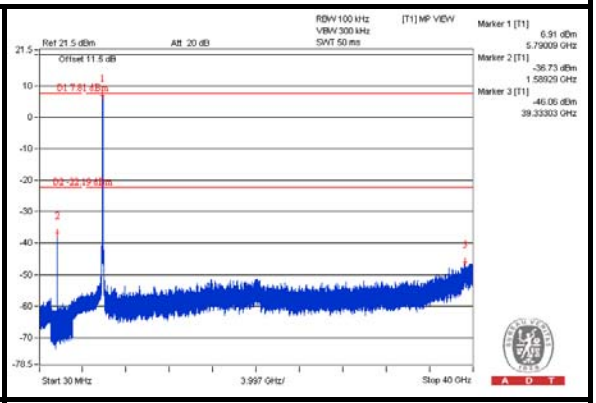
CH 151



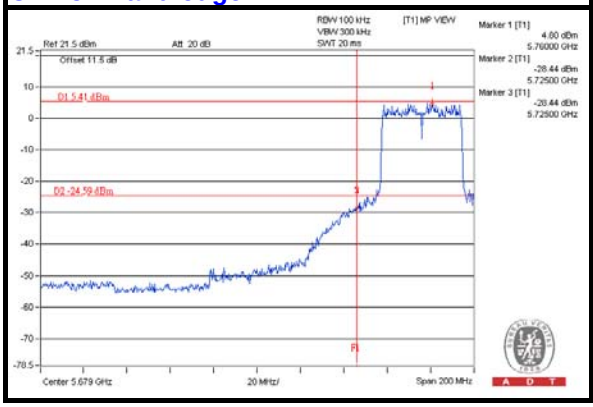


CH 159

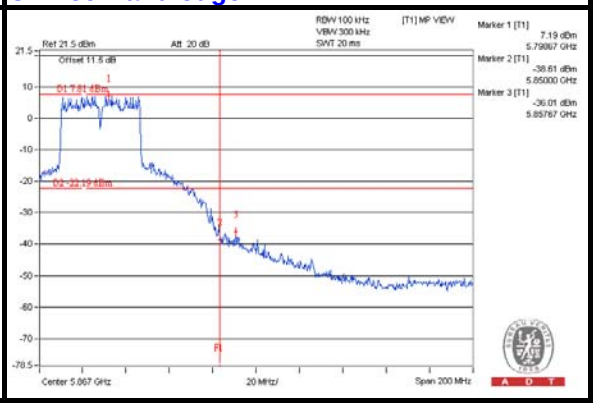




CH 151 Band edge

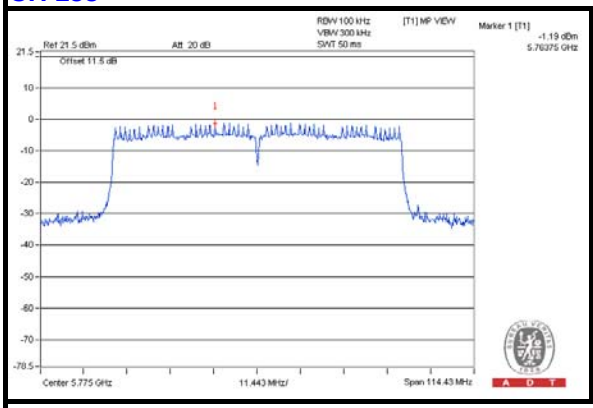


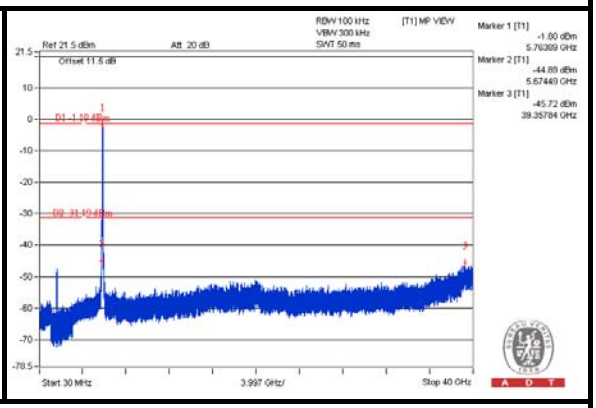
CH 159 Band edge



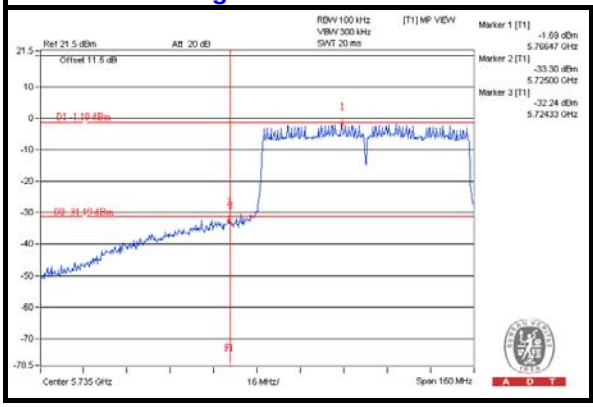
802.11ac (VHT80)
CHAIN 0

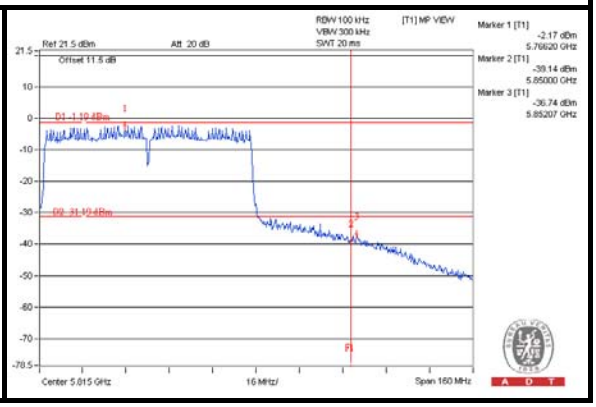
CH 155





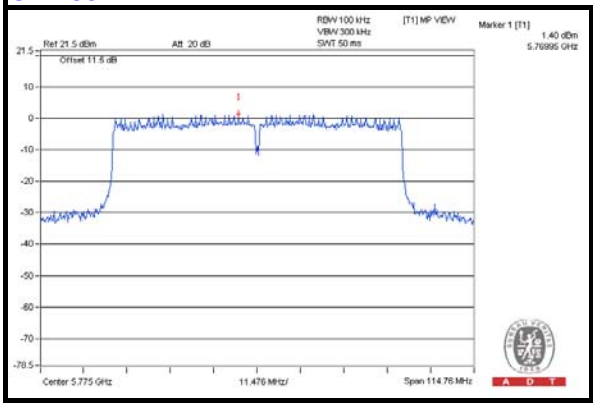
CH 155 Band edge

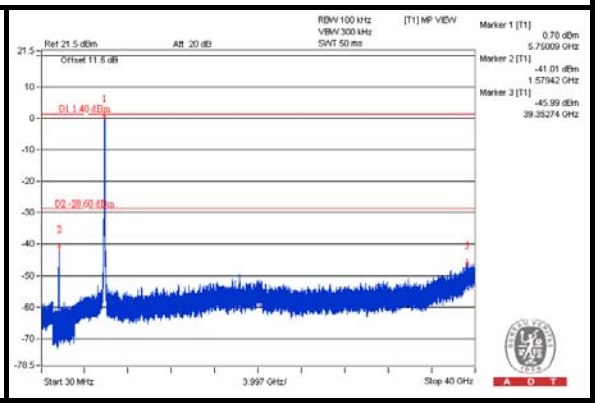




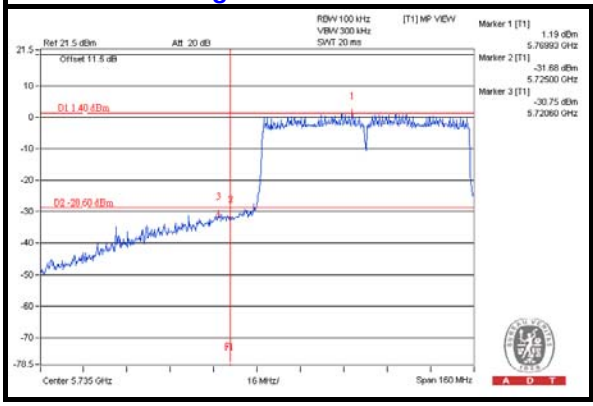
CHAIN 1

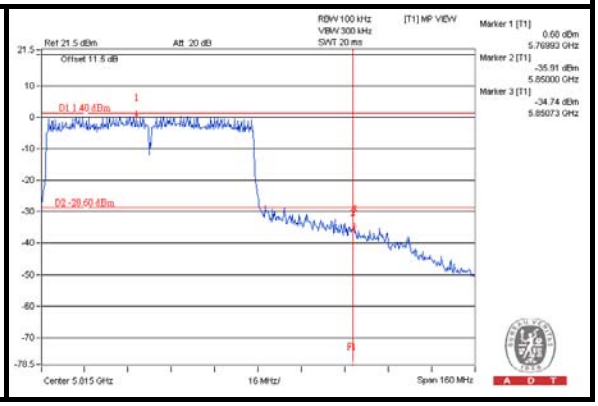
CH 155





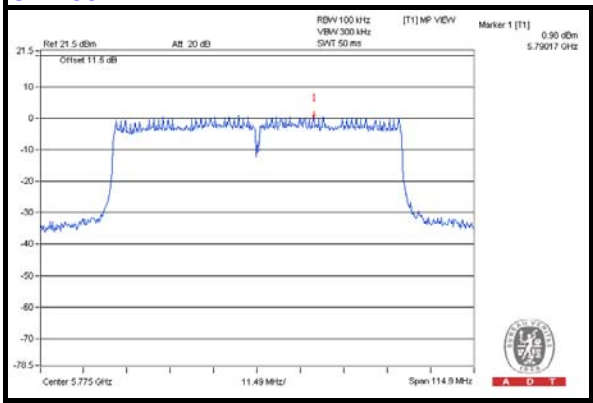
CH 155 Band edge

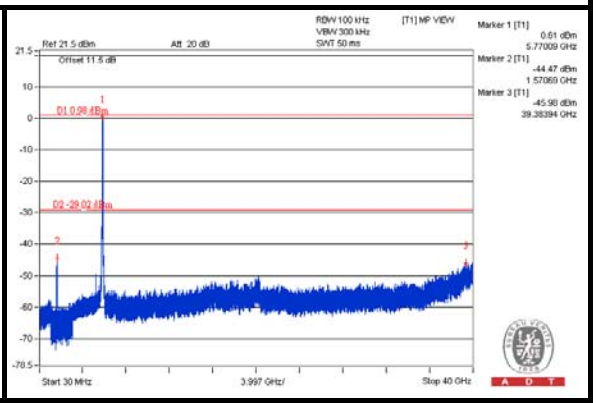




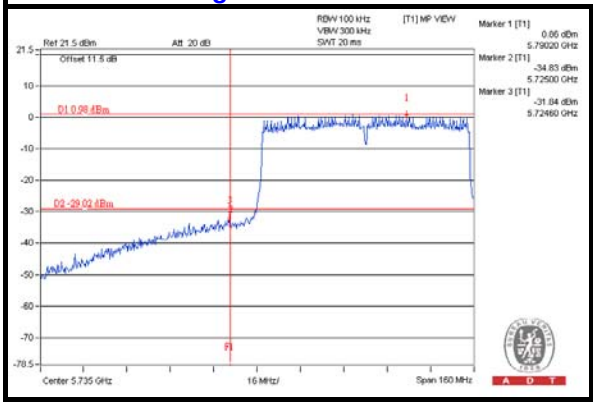
CHAIN 2

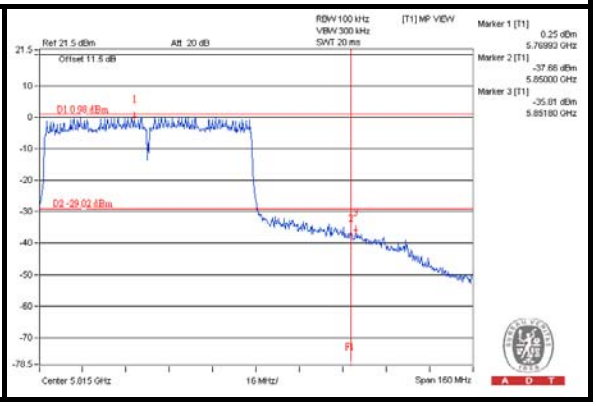
CH 155





CH 155 Band edge





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:

Linko EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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---