MEASUREMENT REPORT

FCC PART 15 Subpart C WLAN 802.11b/g/n

FCC ID:	2AC6AC70
APPLICANT:	Shenzhen Chainway Information Technology Co., Ltd.
Application Type:	Certification
Product:	Mobile Data Terminal
Model No.:	C70
Brand Name:	CHAINWAY
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Part 15 Subpart C (Section 15.247)
Test Procedure(s):	ANSI C63.10-2013, KDB 558074 D01v04
Test Date:	November 2 ~ November 29, 2017

Reviewed By : Kevin Guo
(Kevin Guo)

Approved By : Marlin Chen
(Marlin Chen)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 558074 D01v04. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date	Note
1711RSU00101	Rev. 01	Initial report	12-25-2017	Valid

CONTENTS

§2.1033 General Information

Applicant:	Shenzhen Chainway Information Technology Co., Ltd.
Applicant Address:	9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen, China
Manufacturer:	Shenzhen Chainway Information Technology Co., Ltd.
Manufacturer Address:	9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen, China
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
MRT Registration No.:	893164
MRT designation No.:	CN1166
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Reg. No. 893164) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.**

1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.

2. PRODUCT INFORMATION

2.1. Feature of Equipment under Test

Product Name	Mobile Data Terminal
Model No.	C70
Brand Name:	CHAINWAY
Hardware Version:	C70SEA_mb_v12
Software Version:	C70A_MT6735_V1.2_AM_GIT55c9324_20171104
Wi-Fi Specification	802.11a/b/g/n
Bluetooth Version	V4.0 single mode
GSM Operation Band (s):	GSM 850 / 900 / 1800 / 1900
WCDMA Operation Band (s):	Band II / IV / V
LTE Operation Band (s):	FDD Band 2 / 4 / 7 / 12 / 17
NFC:	13.56MHz
GPS:	1575.42MHz
Components	
Adapter	Model No.: GME10D-050200FUu Input Power: 100 - 240V ~ 50 - 60Hz, 0.28A Output Power: 5VDC 2A

2.2. Product Specification Subjective to this Report

Frequency Range:	802.11b/g/n-HT20: 2412 ~ 2462 MHz 802.11n-HT40: 2422 ~ 2452MHz
Channel Number:	802.11b/g/n-HT20: 11 802.11n-HT40: 7
Type of Modulation:	802.11b: DSSS 802.11g/n: OFDM
Data Rate:	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps
Maximum Peak Output Power:	802.11b: 20.03dBm 802.11g: 21.52dBm 802.11n-HT20: 21.94dBm 802.11n-HT40: 22.54 dBm

Note: For other features of this EUT, test report will be issued separately.

2.3. Operation Frequency / Channel List

802.11b/g/n-HT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	--	--

802.11n-HT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz
06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	--	--	--	--

2.4. Description of Available Antennas

Antenna Type	Frequency Band	Max Peak Gain (dBi)
GPS Internal Antenna		
PIFA	1575.42MHz	0.92
2G Internal Antenna		
PIFA	GSM850	-1.00
	GSM1900	-0.40
3G Internal Antenna		
PIFA	WCDMA Band II	0.45
	WCDMA Band IV	-0.70
	WCDMA Band V	-1.15
4G Internal Antenna		
PIFA	FDD-LTE Band 2	0.50
	FDD-LTE Band 4	0.51
	FDD-LTE Band 7	-0.78
	FDD-LTE Band 12	-0.47
	FDD-LTE Band 17	-0.92
Wi-Fi Internal Antenna		
PIFA	2400 ~ 2483.5MHz	0.58
	5150 ~ 5250MHz	0.70
	5250 ~ 5350MHz	0.71
	5725 ~ 5850MHz	0.72
Bluetooth Internal Antenna		
PIFA	2400 ~ 2483.5MHz	0.58
NFC Internal Antenna		
PIFA	13.56MHz	1.20

2.5. Test Mode

Test Mode	Mode 1: Transmit by 802.11b
	Mode 2: Transmit by 802.11g
	Mode 3: Transmit by 802.11n-HT20
	Mode 4: Transmit by 802.11n-HT40

2.6. Description of Test Software

The test utility software used during testing was supplied by manufacturer.

Power Parameter Value:

Test Mode	Test Frequency (MHz)	Power Parameter Value	Test Mode	Test Frequency (MHz)	Power Parameter Value
802.11b	01	19.0	802.11n-HT20	2412	17.0
	06	19.0		2437	17.0
	11	19.0		2462	17.0
802.11g	01	17.0	802.11n-HT40	2422	16.5
	06	17.0		2437	16.5
	11	17.0		2452	16.5

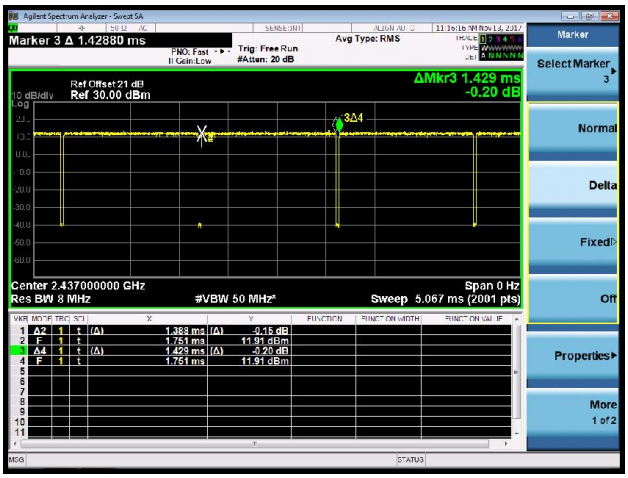
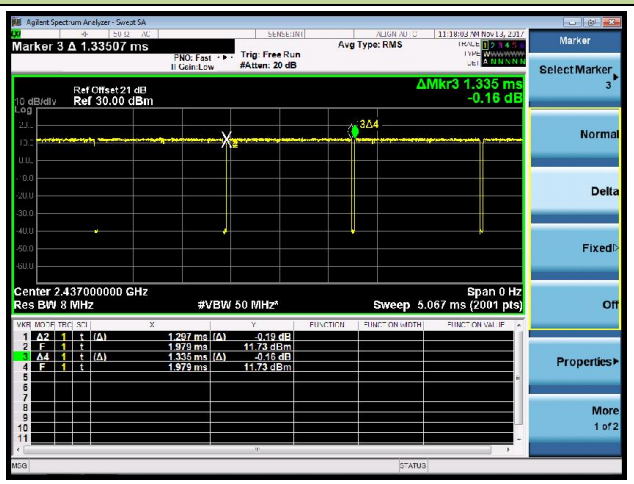
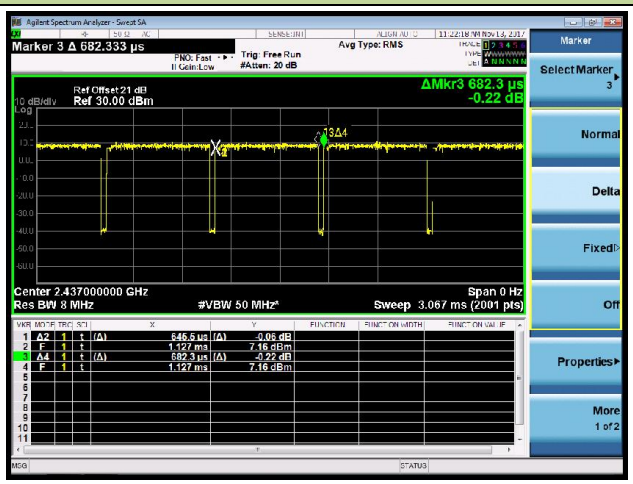
2.7. Device Capabilities

This device contains the following capabilities:

GSM 850/900/1800/1900, WCDMA Band II/IV//V, LTE FDD Band 2/4/7/12/17, 2.4GHz WLAN (DTS), 5GHz WLAN (UNII), Bluetooth (v4.0 single mode), NFC.

Note: 2.4GHz WLAN (DTS) operation is possible in 20MHz channel bandwidths. The maximum achievable duty cycle was determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section 6.0 b) of KDB 558074 D01v04. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Test Mode	Duty Cycle
802.11b	99.64%
802.11g	97.34%
802.11n-HT20	97.15%
802.11n-HT40	94.73%

802.11b (T = 8.355ms)	802.11g (T = 1.388ms)
	
802.11n-HT20 (T = 1.297ms)	**802.11n-HT40 (T = 645.5us)**
	

2.8. Test Configuration

The **Mobile Data Terminal** was tested per the guidance of KDB 558074 D01v04. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.9. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.10. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 558074 D01v04 were used in the measurement of the **Mobile Data Terminal**.

Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.
For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-25GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.
Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna of the **Mobile Data Terminal** is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The **Mobile Data Terminal** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2018/04/25
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2018/06/21
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2018/06/21
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06181	1 year	2017/12/22
Shielding Anechoic Chamber	Mikebang	Chamber-SR2	MRTSUE06214	1 year	2018/05/10

Radiated Emission - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2018/08/18
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2018/09/30
Loop Antenna	Schwarzbeck	FMZB1519	MRTSUE06025	1 year	2018/11/20
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2018/11/18
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2018/10/21
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2018/11/17
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2018/01/04
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06183	1 year	2017/12/22
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2018/05/10

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/04/25
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2018/12/06
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06180	1 year	2017/12/22

Software	Version	Function
e3	V8.3.5	EMI Test Software

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement - SR2
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: 3.46dB
Radiated Emission Measurement - AC1
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 25GHz: 4.76dB
Spurious Emissions, Conducted - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Power Spectrum Density - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.15dB
Occupied Bandwidth - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

7. TEST RESULT

7.1. Summary

Company Name: **Shenzhen Chainway Information Technology Co., Ltd.**
FCC ID: **2AC6AC70**
FCC Classification: **Digital Transmission System (DTS)**
Data Rate(s) Tested: **1Mbps ~ 11Mbps (b); 6Mbps ~ 54Mbps (g); 6.5/7.2Mbps ~ 65.0/72.2Mbps (n-HT20); 13.5/15Mbps ~ 135.0/150.0Mbps (n-HT40).**

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	6dB Bandwidth	≥ 500kHz	Conducted	Pass	Section 7.2
15.247(b)(3)	Output Power	≤ 30dBm		Pass	Section 7.3
15.247(e)	Power Spectral Density	≤ 8dBm/3kHz		Pass	Section 7.4
15.247(d)	Band Edge / Out-of-Band Emissions	≥ 20dBc		Pass	Section 7.5
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 7.6 & 7.7
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.8

Notes:

1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.

7.2. 6dB Bandwidth Measurement

7.2.1.Test Limit

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

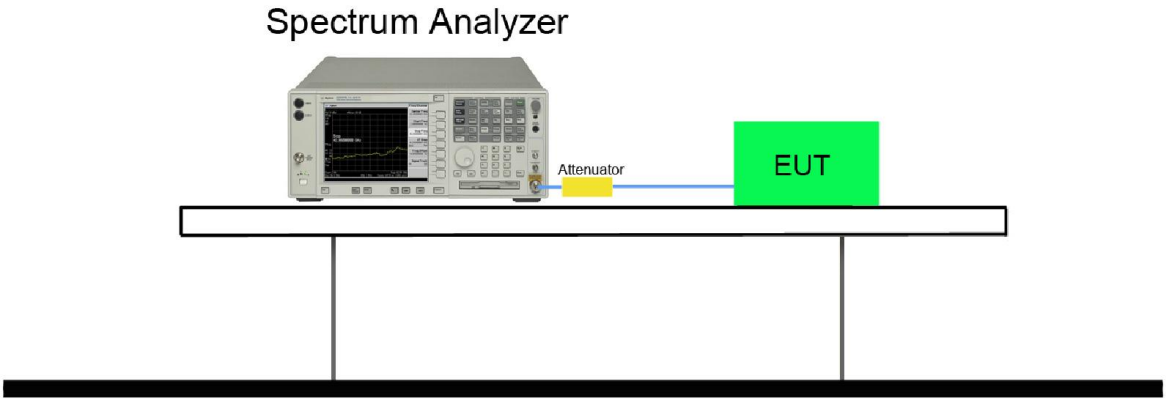
7.2.2.Test Procedure used

KDB 558074 D01v04 – Section 8.2 Option 2

7.2.3.Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace was allowed to stabilize

7.2.4.Test Setup



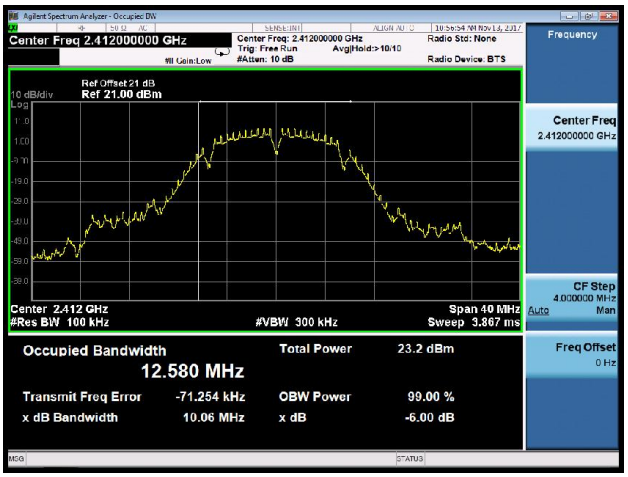
7.2.5.Test Result

Product	Mobile Data Terminal	Temperature	23°C
Test Engineer	Hunk Li	Relative Humidity	54%
Test Site	TR3	Test Date	2017/11/13
Test Item	6dB Bandwidth		

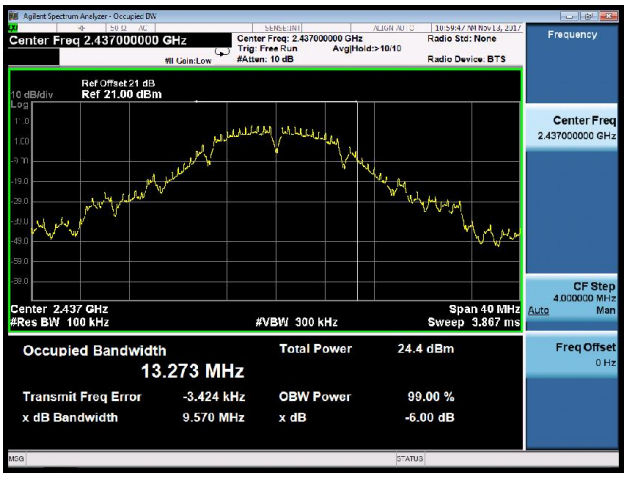
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11b	1	01	2412	10.06	≥0.5	Pass
802.11b	1	06	2437	9.57	≥0.5	Pass
802.11b	1	11	2462	9.57	≥0.5	Pass
802.11g	6	01	2412	16.07	≥0.5	Pass
802.11g	6	06	2437	15.11	≥0.5	Pass
802.11g	6	11	2462	15.72	≥0.5	Pass
802.11n-HT20	6.5	01	2412	17.29	≥0.5	Pass
802.11n-HT20	6.5	06	2437	15.11	≥0.5	Pass
802.11n-HT20	6.5	11	2462	16.33	≥0.5	Pass
802.11n-HT40	13.5	03	2422	35.34	≥0.5	Pass
802.11n-HT40	13.5	06	2437	33.85	≥0.5	Pass
802.11n-HT40	13.5	09	2452	35.68	≥0.5	Pass

802.11b 6dB Bandwidth

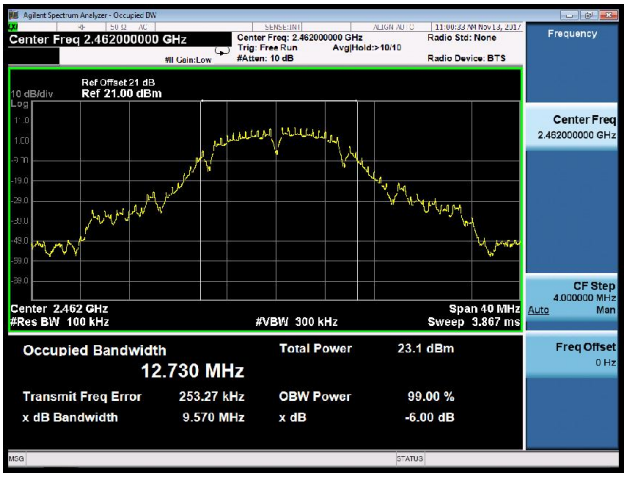
Channel 01 (2412MHz)



Channel 06 (2437MHz)

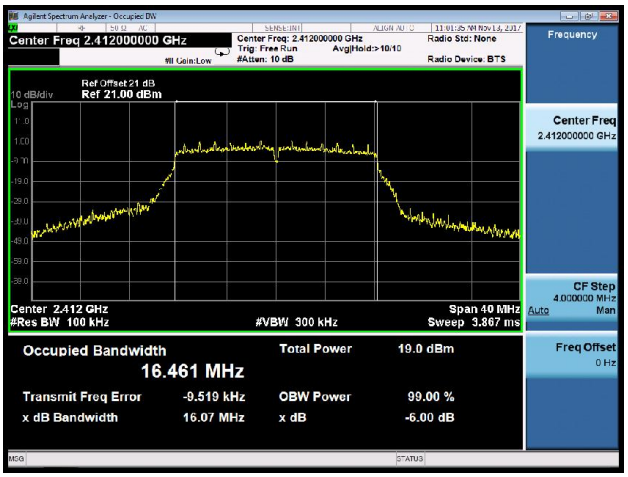


Channel 11 (2462MHz)

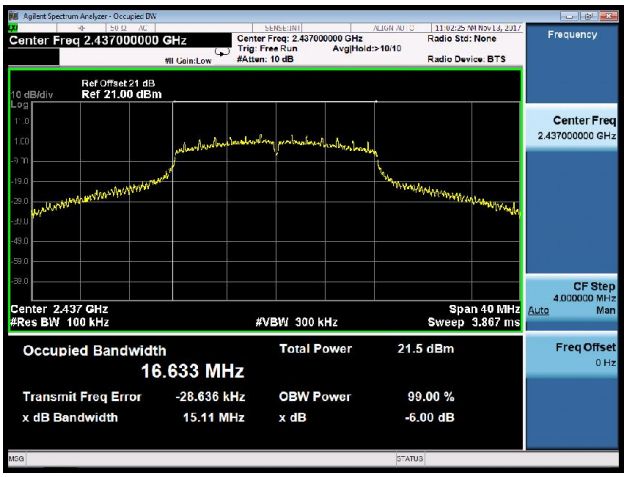


802.11g 6dB Bandwidth

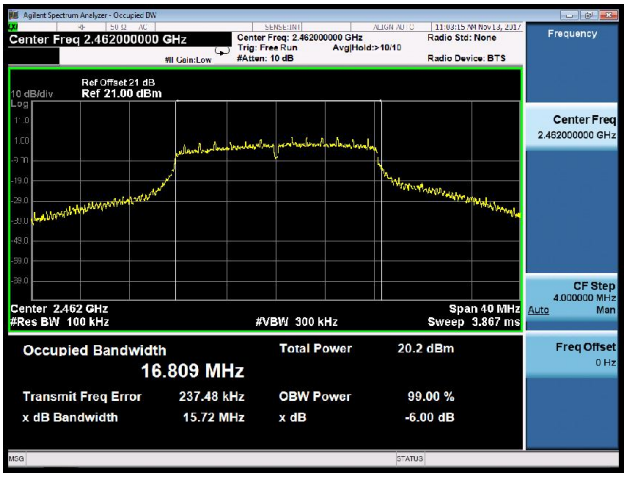
Channel 01 (2412MHz)

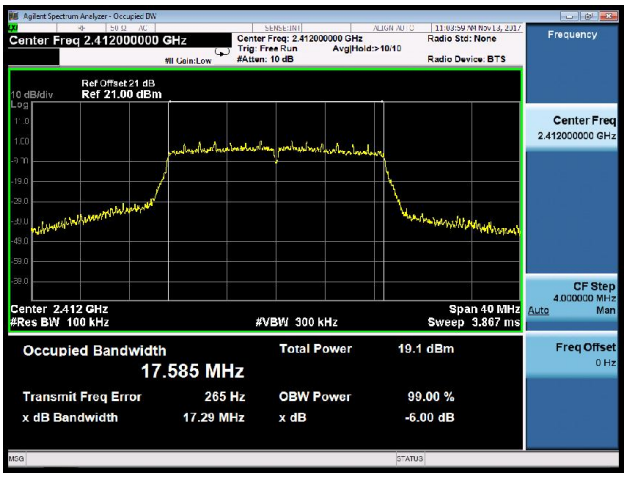
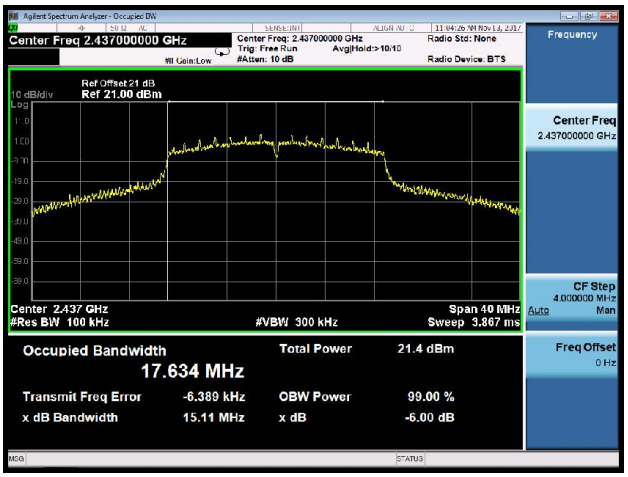
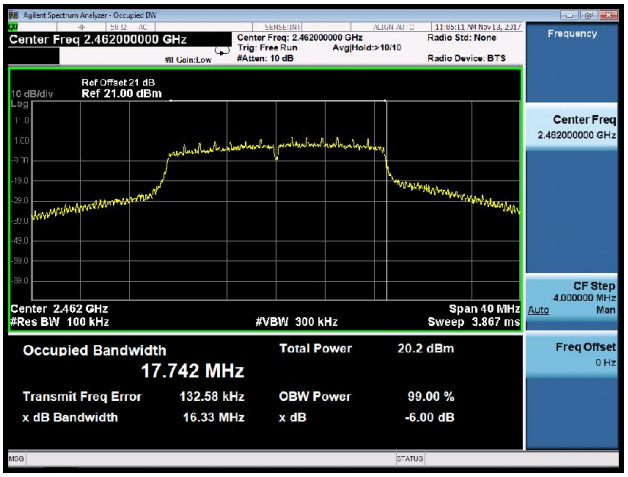


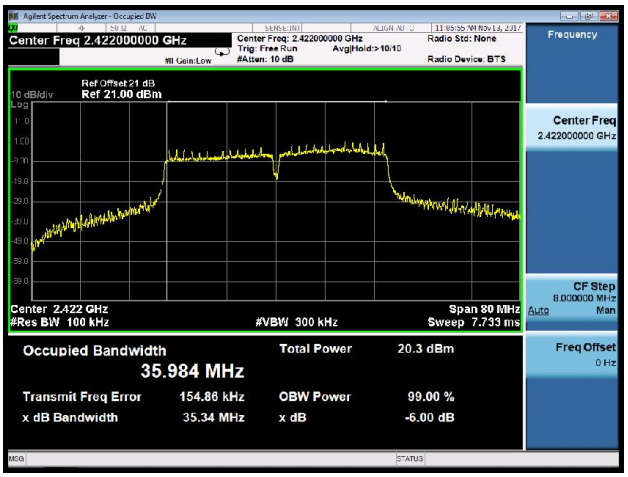
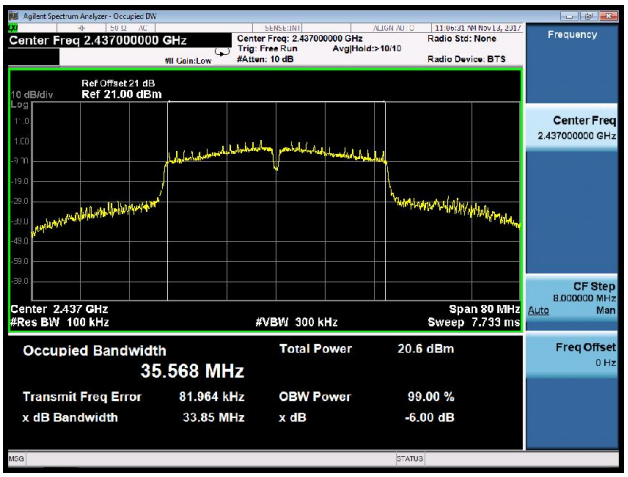
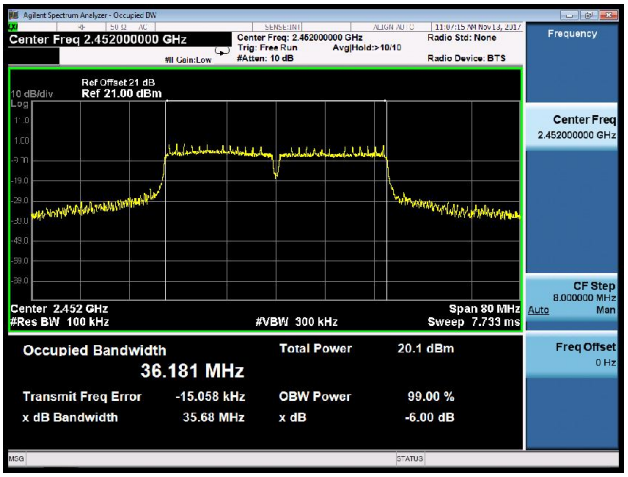
Channel 06 (2437MHz)



Channel 11 (2462MHz)



802.11n-HT20 6dB Bandwidth	
Channel 01 (2412MHz)	**Channel 06 (2437MHz)**
	
Channel 11 (2462MHz)	
	

802.11n-HT40 6dB Bandwidth	
Channel 01 (2422MHz)	**Channel 06 (2437MHz)**
	
Channel 11 (2452MHz)	
	

7.3. Output Power Measurement

7.3.1.Test Limit

The maximum output power shall be less 1 Watt (30dBm).

7.3.2.Test Procedure Used

KDB 558074 D01v04 - Section 9.1.3 PKPM1 - Peak Power Method

KDB 558074 D01v04 - Section 9.2.3.2 AVGPM-G Average Power Method

7.3.3.Test Setting

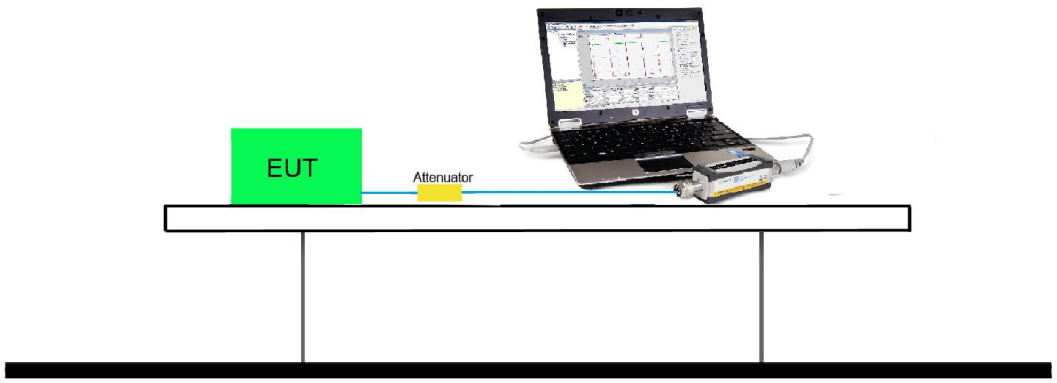
Method PKPM1 (Peak Power Measurement of Signals with DTS BW ≤ 50MHz)

Peak power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

Average Power Measurement

Average power measurements were perform only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

7.3.4.Test Setup



7.3.5.Test Result of Output Power

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (gray marker) for final test of each channel.

Output power at various data rates:

Test Mode	Bandwidth (MHz)	Channel No.	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm)
802.11b	20	6	2437	1	17.29
				5.5	16.52
				11	15.98
802.11g	20	6	2437	6	14.23
				24	13.54
				54	12.46
802.11n	20	6	2437	6.5	14.18
				26.0	13.67
				65.0	12.93
802.11n	40	6	2437	13.5	13.34
				54.0	13.19
				135.0	12.80

Product	Mobile Data Terminal	Temperature	23°C
Test Engineer	Hunk Li	Relative Humidity	54%
Test Site	TR3	Test Date	2017/11/13
Test Item	Output Power		

Test Result of Peak Output Power

Test Mode	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Peak Power (dBm)	Limit (dBm)	Result
11b	1	1	2412	19.43	≤ 30.00	Pass
11b	1	6	2437	20.03	≤ 30.00	Pass
11b	1	11	2462	19.23	≤ 30.00	Pass
11g	6	1	2412	21.52	≤ 30.00	Pass
11g	6	6	2437	21.15	≤ 30.00	Pass
11g	6	11	2462	21.15	≤ 30.00	Pass
11n-HT20	6.5	1	2412	21.94	≤ 30.00	Pass
11n-HT20	6.5	6	2437	21.37	≤ 30.00	Pass
11n-HT20	6.5	11	2462	21.30	≤ 30.00	Pass
11n-HT40	13.5	3	2422	22.33	≤ 30.00	Pass
11n-HT40	13.5	6	2437	22.54	≤ 30.00	Pass
11n-HT40	13.5	9	2452	21.45	≤ 30.00	Pass

Test Result of Average Output Power (Reporting Only)

Test Mode	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Average Power (dBm)	Limit (dBm)	Result
11b	1	1	2412	16.22	≤ 30.00	Pass
11b	1	6	2437	17.29	≤ 30.00	Pass
11b	1	11	2462	16.07	≤ 30.00	Pass
11g	6	1	2412	11.82	≤ 30.00	Pass
11g	6	6	2437	14.23	≤ 30.00	Pass
11g	6	11	2462	12.95	≤ 30.00	Pass
11n-HT20	6.5	1	2412	12.07	≤ 30.00	Pass
11n-HT20	6.5	6	2437	14.18	≤ 30.00	Pass
11n-HT20	6.5	11	2462	12.93	≤ 30.00	Pass
11n-HT40	13.5	3	2422	12.53	≤ 30.00	Pass
11n-HT40	13.5	6	2437	13.34	≤ 30.00	Pass
11n-HT40	13.5	9	2452	12.46	≤ 30.00	Pass

7.4. Power Spectral Density Measurement

7.4.1.Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

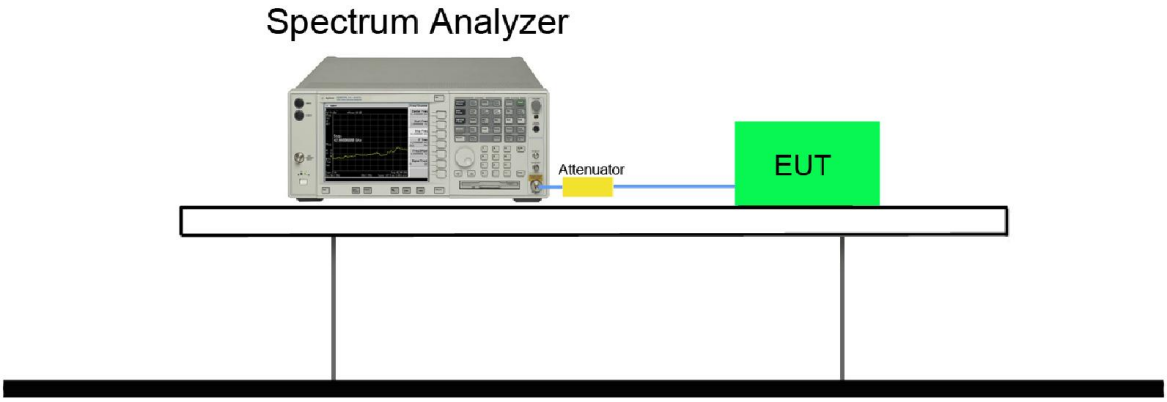
7.4.2.Test Procedure Used

KDB 558074 D01v04 - Section 10.2 Method PKPSD

7.4.3.Test Setting

1) Analyzer was set to the center frequency of the DTS channel under investigation
2) Span = 1.5 times the DTS channel bandwidth
3) RBW = 3kHz
4) VBW = 10kHz
5) Detector = peak
6) Sweep time = auto couple
7) Trace mode = max hold
8) Trace was allowed to stabilize

7.4.4.Test Setup



7.4.5.Test Result

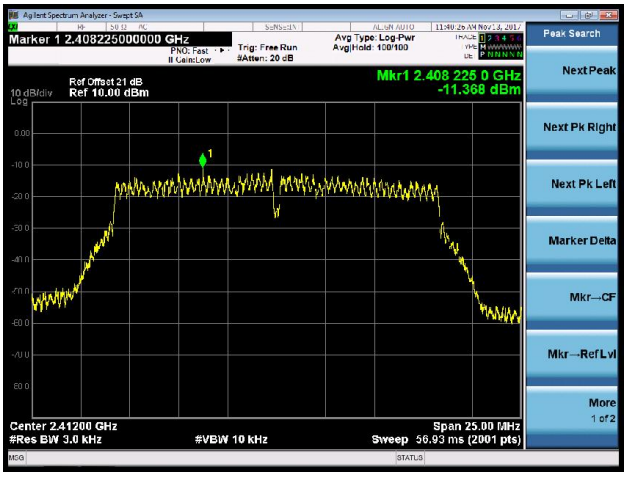
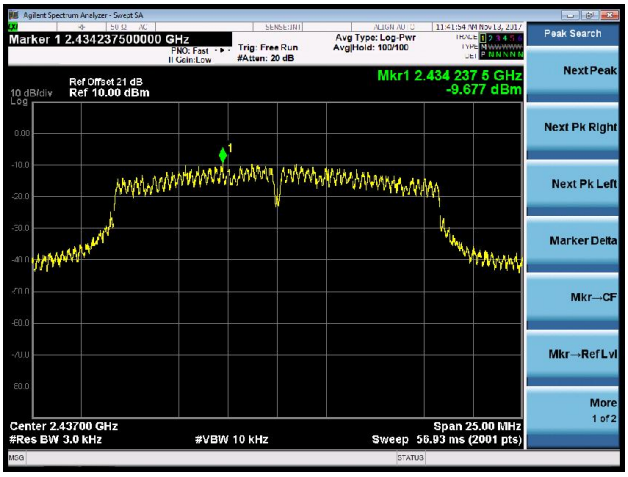
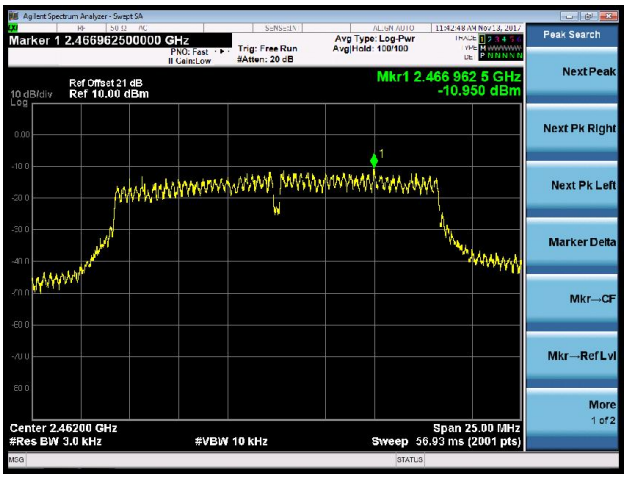
Product	Mobile Data Terminal	Temperature	23°C
Test Engineer	Hunk Li	Relative Humidity	54%
Test Site	TR3	Test Date	2017/11/13
Test Item	Power Spectral Density		

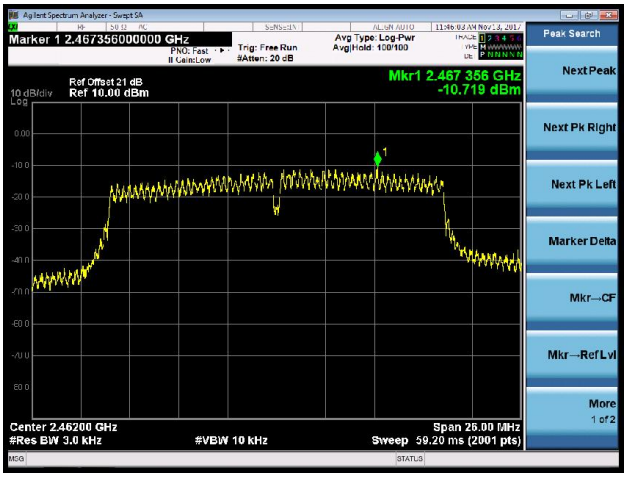
Test Mode	Data Rate (Mbps)	Channel No.	Freq. (MHz)	PSD (dBm/3kHz)	Duty Cycle (%)	Final PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
11b	1	1	2412	-4.19	99.64	-4.19	≤ 8.0	Pass
11b	1	6	2437	-5.66	99.64	-5.66	≤ 8.0	Pass
11b	1	11	2462	-5.39	99.64	-5.39	≤ 8.0	Pass
11g	6	1	2412	-11.37	97.34	-11.25	≤ 8.0	Pass
11g	6	6	2437	-9.68	97.34	-9.56	≤ 8.0	Pass
11g	6	11	2462	-10.95	97.34	-10.83	≤ 8.0	Pass
11n-HT20	6.5	1	2412	-12.49	97.15	-12.36	≤ 8.0	Pass
11n-HT20	6.5	6	2437	-9.54	97.15	-9.41	≤ 8.0	Pass
11n-HT20	6.5	11	2462	-10.72	97.15	-10.59	≤ 8.0	Pass
11n-HT40	13.5	3	2422	-13.08	94.73	-12.84	≤ 8.0	Pass
11n-HT40	13.5	6	2437	-11.87	94.73	-11.63	≤ 8.0	Pass
11n-HT40	13.5	9	2452	-14.33	94.73	-14.09	≤ 8.0	Pass

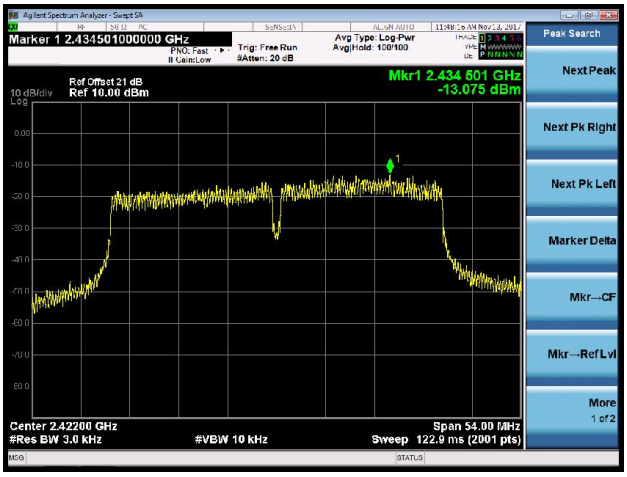
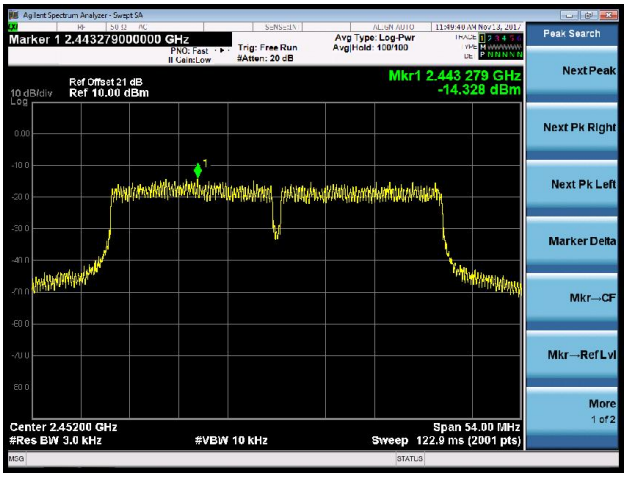
Note 1: When EUT duty cycle ≥ 98%, Final PSD (dBm/3kHz) = PSD (dBm/3kHz).

Note 2: When EUT duty cycle < 98%, Final PSD (dBm/3kHz) = PSD (dBm/3kHz) + 10*log (1/Duty Cycle).

802.11b Peak PSD	
Channel 01 (2412MHz)	**Channel 06 (2437MHz)**
	
Channel 11 (2462MHz)	
	

802.11g Peak PSD	
Channel 01 (2412MHz)	**Channel 06 (2437MHz)**
	
Channel 11 (2462MHz)	
	

802.11n-HT20 Peak PSD	
Channel 01 (2412MHz)	**Channel 06 (2437MHz)**
	
Channel 11 (2462MHz)	
	

802.11n-HT40 Peak PSD	
Channel 01 (2422MHz)	**Channel 06 (2437MHz)**
	
Channel 11 (2452MHz)	
	

7.5. Conducted Band Edge and Out-of-Band Emissions

7.5.1.Test Limit

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth per the PSD procedure.

7.5.2.Test Procedure Used

KDB 558074 D01v04 - Section 11.2 & Section 11.3

7.5.3.Test Settitng

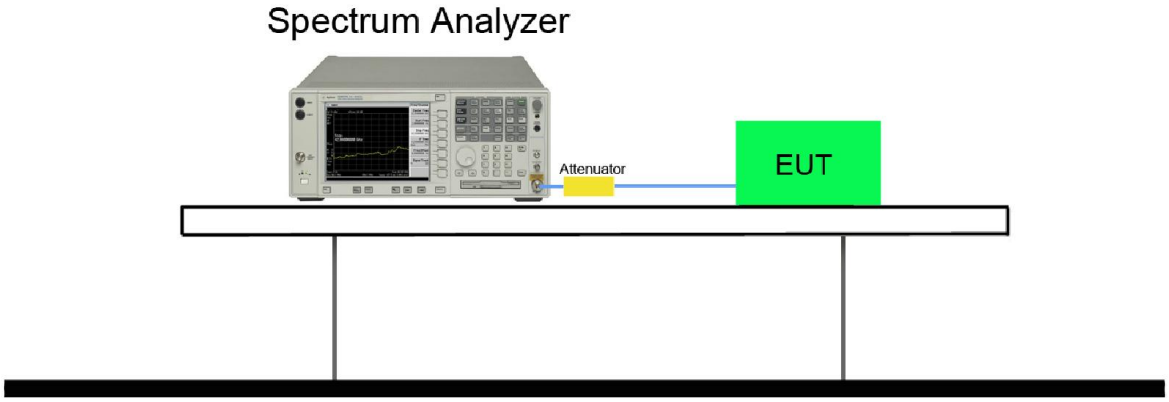
Reference level measurement

1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW ≥ 3 x RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

Emission level measurement

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Number of sweep points ≥ 2 x Span/RBW
6. Trace mode = max hold
7. Sweep time = auto couple
8. The trace was allowed to stabilize

7.5.4.Test Setup



7.5.5.Test Result

Product	Mobile Data Terminal	Temperature	23°C
Test Engineer	Hunk Li	Relative Humidity	54%
Test Site	TR3	Test Date	2017/11/13
Test Item	Conducted Band Edge and Out-of-Band Emissions		

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Limit	Result
802.11b	1	01	2412	20dBc	Pass
802.11b	1	06	2437	20dBc	Pass
802.11b	1	11	2462	20dBc	Pass
802.11g	6	01	2412	20dBc	Pass
802.11g	6	06	2437	20dBc	Pass
802.11g	6	11	2462	20dBc	Pass
802.11n-HT20	6.5	01	2412	20dBc	Pass
802.11n-HT20	6.5	06	2437	20dBc	Pass
802.11n-HT20	6.5	11	2462	20dBc	Pass
802.11n-HT40	13.5	03	2422	20dBc	Pass
802.11n-HT40	13.5	06	2437	20dBc	Pass
802.11n-HT40	13.5	09	2452	20dBc	Pass

802.11b Out-of-Band Emissions

Channel 01 (2412MHz)

100kHz PSD Reference Level

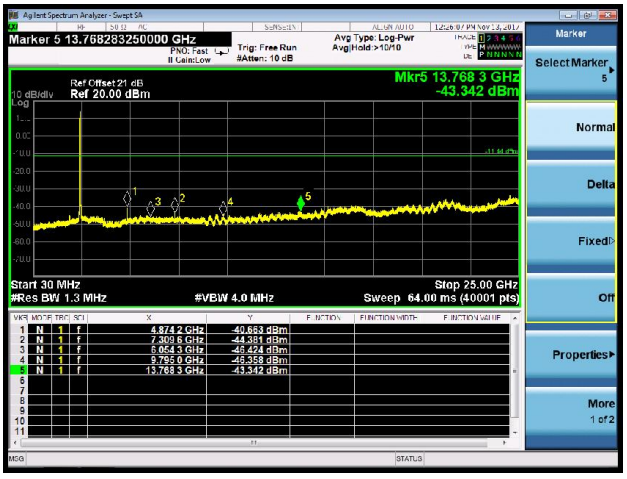
Low Band Edge

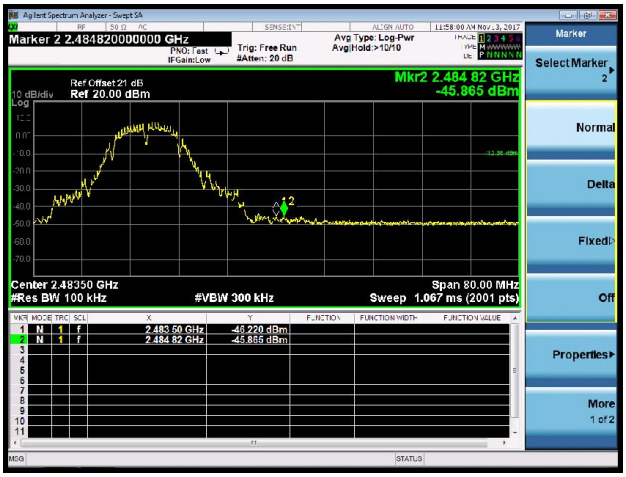
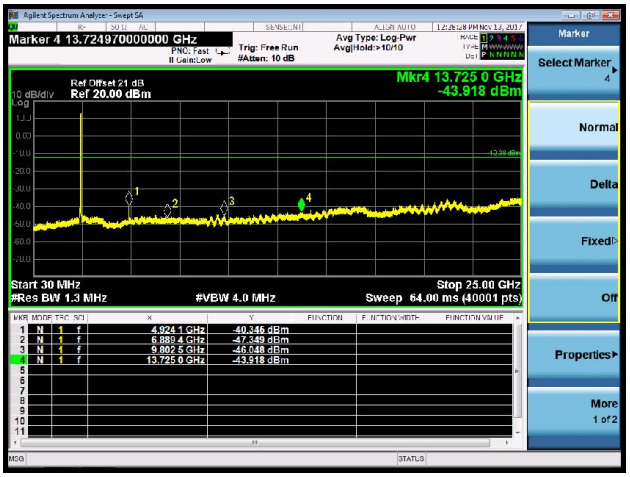
Spurious Emission

Channel 06 (2437MHz)

100kHz PSD Reference Level

Spurious Emission



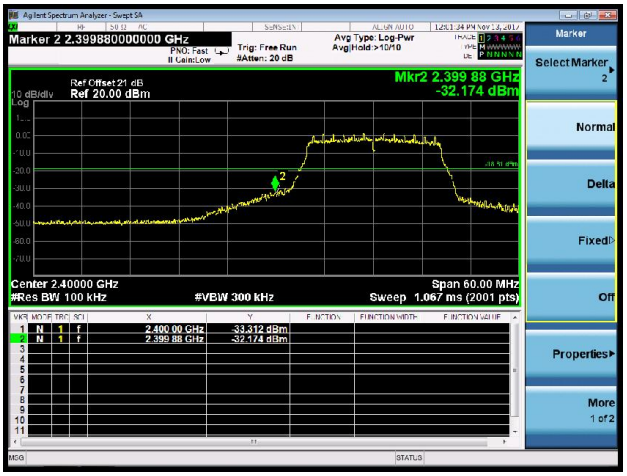
Channel 11 (2462MHz)	
100kHz PSD Reference Level	**High Band Edge**
	
Spurious Emission	
	

802.11g Out-of-Band Emissions

Channel 01 (2412MHz)

100kHz PSD Reference Level

Low Band Edge

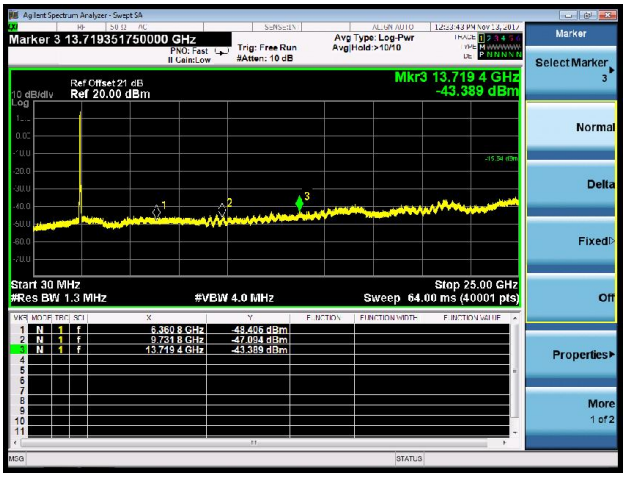


Spurious Emission

Channel 06 (2437MHz)

100kHz PSD Reference Level

Spurious Emission



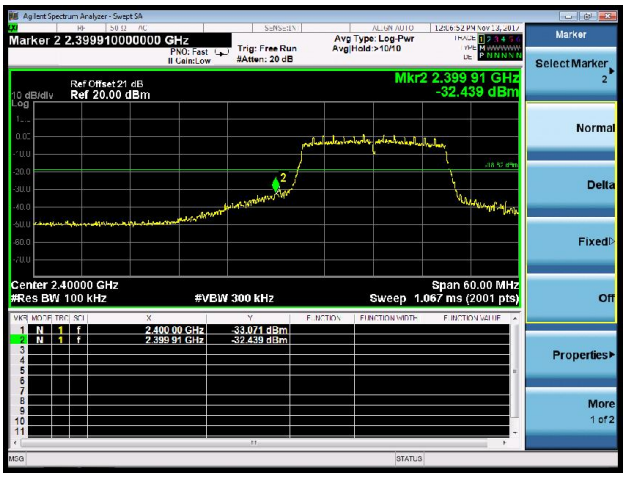
Channel 11 (2462MHz)	
100kHz PSD Reference Level	**High Band Edge**
	
Spurious Emission	
	

802.11n-HT20 Out-of-Band Emissions

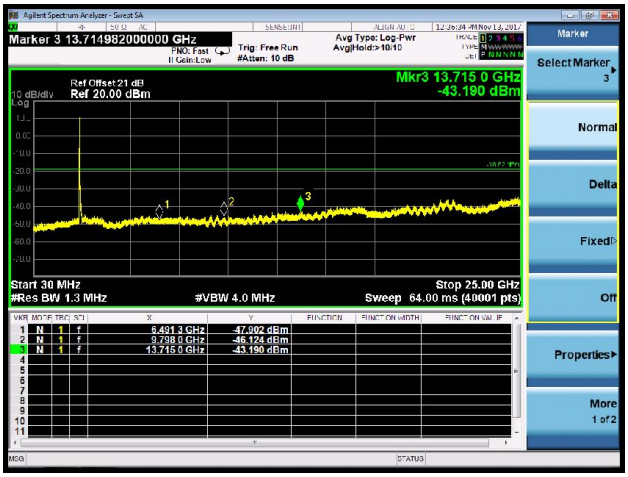
Channel 01 (2412MHz)

100kHz PSD Reference Level

Low Band Edge

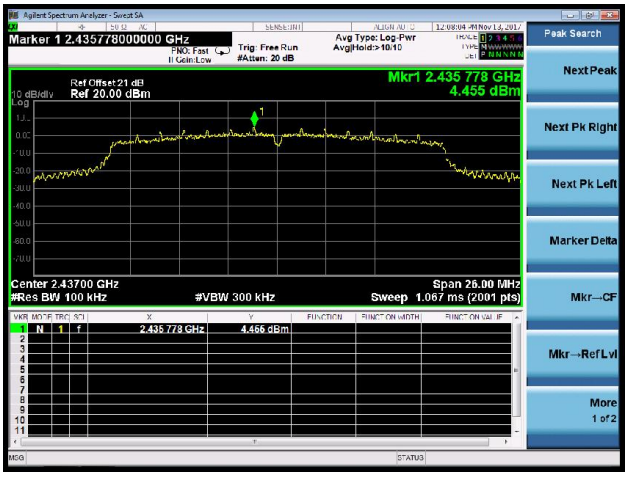


Spurious Emission



Channel 06 (2437MHz)

100kHz PSD Reference Level



Spurious Emission