

# **FCC Test Report**

Product Name	MOBILE DATA TERMINAL
Model No	MT7010
FCC ID.	2ABTU-MT7010

Applicant	RuggON Corporation
Address	4F, No. 298, Yang Guang St. Neihu Dist., Taipei City, Taiwan

Date of Receipt	Aug. 29, 2017
Issue Date	Oct. 23, 2017
Report No.	1780508R-RFUSP12V00-B
Report Version	V1.0
AC-MRA	Testing Laboratory 3023

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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# Test Report

Issue Date: Oct. 23, 2017 Report No.: 1780508R-RFUSP12V00-B



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Product Name	MOBILE DATA TERMINAL
Applicant	RuggON Corporation
Address	4F, No. 298, Yang Guang St. Neihu Dist., Taipei City, Taiwan
Manufacturer	RuggON Corporation
Model No.	MT7010
FCC ID.	2ABTU-MT7010
EUT Rated Voltage	DC 9-36V
EUT Test Voltage	DC 12V
Trade Name	RuggON
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2016
	ANSI C63.4: 2014, ANSI C63.10: 2013
	KDB 558074 D01 DTS Meas Guidance v04
Test Result	Complied
Documented By	: Joanne liv (Senior Adm. Specialist / Joanne Lin)
Tested By	Anson In

(Engineer / Anson Lu)

Approved By

:

tron

(Director / Vincent Lin)



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# DEKRA

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## 1. GENERAL INFORMATION

## **1.1. EUT Description**

Product Name	MOBILE DATA TERMINAL
Trade Name	RuggON
Model No.	MT7010
FCC ID.	2ABTU-MT7010
Frequency Range	2412-2462MHz for 802.11b/g/n-20BW
Number of Channels	802.11b/g/n-20MHz: 11
Data Speed	802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: up to 72.2Mbps
Type of Modulation	802.11b:DSSS (DBPSK, DQPSK, CCK)
	802.11g/n:OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Type	PIFA Antenna
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto

## Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Anjie	MT7010	PIFA Antenna	2.14dBi for 2.4 GHz

Note:

1. The antenna of EUT conforms to FCC 15.203.

2. Only the higher gain antenna was tested and recorded in this report



802.11b/g/n-20MHz Center Frequency of Each Channel:

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

**Duty Cycle:** 

802.11b	0.976
802.11g	0.865
802.11n-20	0.857

\*Duty cycle = Ton / (Ton + Toff)

802.11g:

Keysight Spectrum Analyzer - Swept SA				00	Keysight Spectrum Analyzer - Swep	pt SA				000
Center Freq 2.412000000 GHz	SENSE INT	Aug Type: Log-Pwr	08:14:31 AM Oct 16, 2017 TRACE 1 2 3 4 5 6	Frequency	Center Freq 2.41200	0000 GHz	SENSE: INT	Avg Type: Log-Pwr	06:16:22 AM Oct 16, 2017 TRACE 1 2 3 4 5 6	Frequency
PNO: F IFGain:	Low Atten: 30 dB		DETPNNNNN	Auto Tune		PNO: Fast	Atten: 30 dB		DETPNNNNN	Auto Tune
Ref Offset 0.5 dB 10 dB/div Ref 20.50 dBm			Mkr1 850.0 µs 7.32 dBm		10 dB/div Ref Offset 0.5 Ref 20.50 d	dB Bm			Mkr1 3.800 ms -1.26 dBm	
10.5 0.500	· · · · ·		2/8/1	Center Freq 2.412000000 GHz	10.5 0.500	p-al-bankan \$1	248K1	nersent phoneselson	nal traditionality	Center Freq 2.412000000 GHz
-19.5				Start Freq 2.412000000 GHz	-19.5					Start Freq 2.412000000 GHz
-49.5 -59.5 -69.5			~~~~	Stop Freq 2.412000000 GHz	-49.5	w w		M	N V	Stop Freq 2.412000000 GHz
Center 2.412000000 GHz Res BW 1.0 MHz	VBW 1.0 MHz	Sweep 10	Span 0 Hz ).00 ms (1001 pts)	CF Step 1.000000 MHz Auto Man	Center 2.412000000 G Res BW 1.0 MHz	Hz VBW 1	I.0 MHz	Sweep 1	Span 0 Hz 0.00 ms (1001 pts)	CF Step 1.000000 MHz Auto Man
N         t         850.01           2         Δ1         t         Δ1         8.190 n           3         Δ1         t         (Δ)         8.390 n           4         5         5         5	7.32 dBm (Δ) -0.11 dB (Δ) 0.02 dB	PLACE ON WORK	FUNCTION VALUE	Freq Offset 0 Hz	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	3,800 ms 1.350 ms (Δ) 1.560 ms (Δ)	-1.26 dBm 1.40 dB 0.03 dB		FORCTON WEDE	Freq Offset 0 Hz
9999 1001111111111111111111111111111111		STATUS			8 9 10 11 *1			STATUS		

#### 802.11n20:

Keysight Spectrum	n Analyzer - Swept	SA							
Center Freq	2.412000	000 GHz PNO: Fat	u -+- 1	sense in	Avg	Type: Log-Pwr	08:17:58 AM TRAC TVP	Oct 16, 2017 E 1 2 3 4 5 6 WWWWWW	Frequency
10 dB/div R	ef Offset 0.5 d ef 20.50 dB	IFGain:Lo IB Im	w A	Atten: 30 dB			Mkr1 3. -2.3	920 ms 33 dBm	Auto Tune
10.5 0.500		1 m.s. 4.94		**************************************	3 <u>5</u> 1	o philopolice	da polonese	14 Mar	Center Free 2.412000000 GH
-19.5									Start Free 2.412000000 GH
-49.5 b) -59.5		u,	4	н		44	*	w	Stop Free 2.412000000 GH
Center 2.412 Res BW 1.0	000000 GH MHz	iz v	BW 1.0	MHz		Sweep 1	S 0.00 ms (1	pan 0 Hz 1001 pts)	CF Step 1.000000 MH Auto Ma
	α (Δ) (Δ)	3.920 mt 1.260 mt 1.470 mt	(Δ) (Δ)	-2.33 dBm 2.89 dB 0.02 dB	FUNCTION	FUNCTION WOTH	FUNCTION	n Wallie -	Freq Offse 0 H
8 9								=	

- 1. The EUT is a MOBILE DATA TERMINAL with a built-in WLAN and Bluetooth transceiver, this report for 2.4GHz WLAN.
- 2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
- 3. At result of pretests, module supports dual-channel transmission, only the worst case is shown in the report.
- 4. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11b is 1Mbps \$ 802.11g is 6Mbps \$ 802.11n(20M-BW) is 7.2Mbps)
- 5. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11b/g/n transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices.
- 6. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

	Mode 1: Transmit (802.11b 1Mbps)					
Test Mode:	Mode 2: Transmit (802.11g 6Mbps)					
	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)					

## **1.3.** Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	GPS Antenna	N/A	N/A	N/A	N/A
2	Modem	ACEEX	DM-1414	0102027550	Non-Shielded, 1.8m
3	Mouse	Logitech	M-SBM96B	810-000439	N/A
4	WD HDD 2.5	Western Digital	WD1200BEVS	WXE108L30036	Non-Shielded, 1.8m With Core*1
5	Earphone	Dr.AV	CD-806B	N/A	N/A
6	Modem	ACEEX	DM-1414	0102027533	Non-Shielded, 1.8m
7	DC 12V Battery	TRANE	12B50PE	N/A	N/A

Signal Cable Type		Signal cable Description			
А	Signal Cable	Non-Shielded, 1.3m			
В	Signal Cable	Non-Shielded, 1.2m			
С	Signal Cable	Non-Shielded, 1.8m			
D	USB Cable	Non-Shielded, 0.4m			
Е	Signal Cable	Non-Shielded, 1.8m			
F	Signal Cable	Non-Shielded, 1.2m			
G	Signal Cable	Non-Shielded, 0.7m			
Η	Network Cable	Non-Shielded, 1.8m			
Ι	Signal Cable	Non-Shielded, 1.5m			

## **1.4.** Configuration of Tested System





## **1.5.** EUT Exercise Software

- 1. Setup the EUT as shown in Section 1.4.
- 2. Execute software "RF Test V3.10.49" on the EUT.
- 3. Configure the test mode, the test channel, and the data rate.
- 4. Press "OK" to start the continuous Transmit.
- 5. Verify that the EUT works properly.

## 1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

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http://www.dekra.com.tw/english/about/certificates.aspx?bval=5

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: <u>http://www.dekra.com.tw/index\_en.aspx</u>

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FCC Accreditation Number: TW3023



## 1.7. List of Test Equipment

#### For Conducted measurements /CB3/SR8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
	Temperature Chamber	WIT GROUP	TH-1S-B	EQ-201-00146	2016/11/28	2017/11/27
Х	Spectrum Analyzer	Agilent	N9010A	MY48030495	2017/7/22	2018/7/21
Х	Power Meter	Anritsu	ML2495A	6K00003357	2017/6/23	2018/6/22
Х	Pulse power sensor	Anritsu	MA2411B	0846193	2017/6/23	2018/6/22
Х	EMI Test Receiver	R&S	ESCS 30	100369	2017/10/13	2018/10/12
Х	LISN	R&S	ESH3-Z5	836679/017	2017/1/18	2018/1/17
Х	LISN	R&S	ENV216	100097	2017/1/18	2018/1/17
Х	Coaxial Cable	QTK(Arnist)	RG 400	LC018-RG	2017/6/25	2018/6/24

#### For Radiated measurements /Site3/CB8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
Х	Spectrum Analyzer	R&S	FSP40	100170	2017/1/18	2018/1/17
Х	Loop Antenna	Teseq	HLA6121	37133	2017/3/18	2018/3/17
Х	Bi-Log Antenna	Schaffner Chase	CBL6112B	2707	2017/6/11	2018/6/10
Х	Horn Antenna	ETS-Lindgren	3117	00135205	2017/4/6	2018/4/5
Х	Horn Antenna	Schwarzbeck	BBHA9170	9170430	2017/4/14	2018/4/13
Х	Pre-Amplifier	QTK	AP/0100A	CHM/0901069	2017/6/23	2018/6/22
Х	Pre-Amplifier	EMCI	EMC012630SE	980210	2017/1/26	2018/1/24
Х	Pre-Amplifier	NARDA WE	DBL-1840N506	013	2017/9/30	2018/9/29
Х	Filter	MicroTRON	BRM50701	019	2016/11/2	2017/11/1
Х	Filter	Microwave Circuits	N0257881	36681	2017/1/3	2018/1/2
Х	EMI Test Receiver	R&S	ESR26	101385	2017/9/29	2018/9/28
Х	Coaxial Cable	QTK(Arnist)	SUCOFLEX 106	L1606-015C	2017/6/23	2018/6/22
Х	EMI Test Receiver	R&S	ESCS 30	838251/001	2017/7/21	2018/7/20
Χ	Coaxial Cable	QTK(Arnist)	RG 214	LC003-RG	2017/6/16	2018/6/15
Χ	Coaxial signal switch	Anritsu	MP59B	6201415889	2017/6/16	2018/6/15

Note:

1. All equipments are calibrated every one year.

2. The test instruments marked with "X" are used to measure the final test results.

3. Test Software version :QuieTek EMI 2.0 V2.1.113.



## 2. Conducted Emission

## 2.1. Test Setup





## 2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit								
Frequency	Limits							
MHz	QP	AVG						
0.15 - 0.50	66-56	56-46						
0.50-5.0	56	46						
5.0 - 30	60	50						

## 2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

## 2.4. Uncertainty

± 2.26 dB



## 2.5. Test Result of Conducted Emission

Owing to the DC operation of EUT, this test item is not performed.



## 3. Peak Power Output

## 3.1. Test Setup



## 3.2. Limits

The maximum peak power shall be less 1 Watt.

## **3.3.** Test Procedure

Tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using KDB 558074 section 9.1.3 PKPM1 Peak power meter method.

## 3.4. Uncertainty

± 1.19 dB

## 3.5. Test Result of Peak Power Output

Product	:	MOBILE DATA TERMINAL
Test Item	:	Peak Power Output Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/05
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps)

Channal Na	Frequency	For d	Average ifferent Da	e Power ata Rate (N	/lbps)	Peak Power	Required	Recult	
Channel No	(MHz)	1	2	5.5	11	1	Limit	Kesult	
			Measur	ement Lev	vel (dBm)				
01	2412	13.01				15.97	<30dBm	Pass	
06	2437	13.93	13.85	13.78	13.72	16.64	<30dBm	Pass	
11	2462	14.51				17.16	<30dBm	Pass	

Note: Peak Power Output Value =Reading value on power meter + cable loss



- Product : MOBILE DATA TERMINAL Peak Power Output Data
- Test Item :
- Test Site : No.3 OATS
- Test Date 2017/10/05 :
- Test Mode : Mode 2: Transmit (802.11g 6Mbps)

	Fraguarau	Average PowerPeakFor different Data Rate (Mbps)Power								Dequired		
Channel No	(MHz)	6	9	12	18	24	36	48	54	6	Limit	Result
		Measurement Level (dBm)										
01	2412	12.35								18.29	<30dBm	Pass
06	2437	13.12	13.05	12.98	12.92	12.85	12.78	12.71	12.63	18.55	<30dBm	Pass
11	2462	12.38								17.62	<30dBm	Pass

Note: Peak Power Output Value =Reading value on power meter + cable loss



Product MOBILE DATA TERMINAL :

Peak Power Output Data

- Test Item :
- Test Site
- No.3 OATS : Test Date 2017/10/05 :
- Test Mode

Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) :

	Engguanau		Average PowerPeakFor different Data Rate (Mbps)Power						Dequired			
Channel No	(MHz)	7.2	14.4	21.7	28.9	43.3	57.8	65	72.2	7.2	Limit	Result
		Measurement Level (dBm)										
01	2412	11.79								17.98	<30dBm	Pass
06	2437	13.07	13.01	12.93	12.85	12.78	12.71	12.62	12.55	18.49	<30dBm	Pass
11	2462	12.81			-					18.34	<30dBm	Pass

Note: Peak Power Output Value =Reading value on power meter + cable loss



## 4. Radiated Emission

## 4.1. Test Setup

Radiated Emission Under 30MHz



3m

Radiated Emission Below 1GHz





#### Radiated Emission Above 1GHz



## 4.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits								
Frequency MHz	Field strength	Measurement distance						
IVITIZ	(microvolts/meter)	(meter)						
0.009-0.490	2400/F(kHz)	300						
0.490-1.705	24000/F(kHz)	30						
1.705-30	30	30						
30-88	100	3						
88-216	150	3						
216-960	200	3						
Above 960	500	3						

Remarks: E field strength  $(dB\mu V/m) = 20 \log E$  field strength (uV/m)

## 4.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement. The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna. The worst radiated emission is measured in the Open Area Test Site on the Final Measurement. The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

The average measurement tested according to KDB 558074 section 12.2.5.3. Reduced VBW averaging across on- and off-times of the EUT transmissions with max hold. VDW > 1/T.

Mode	Duty Cycle	Т	1/T	VBW Setting
802.11b	0.976	8.19	122	120 Hz
802.11g	0.865	1.35	741	1kHz
802.11n20	0.857	1.26	794	1kHz

VBW  $\geq 1/T$ :

## 4.4. Uncertainty

- ± 4.08 dB above 1GHz
- ± 4.22 dB below 1GHz



## 4.5. Test Result of Radiated Emission

Product	:	MOBILE DATA TERMINAL
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/13
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
<b>Peak Detector:</b>					
4824.000	2.428	40.202	42.631	-31.369	74.000
7236.000	9.177	38.191	47.368	-26.632	74.000
9648.000	10.019	37.882	47.902	-26.098	74.000
Average Detector:					
Vertical					
<b>Peak Detector:</b>					
4824.000	2.836	40.051	42.888	-31.112	74.000
7236.000	9.676	38.556	48.232	-25.768	74.000
9648.000	10.556	37.502	48.059	-25.941	74.000

#### **Average Detector:**

---

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 120 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	MOBILE DATA TERMINAL							
Test Item	:	Harmonic Ra	Harmonic Radiated Emission Data						
Test Site	:	No.3 OATS							
Test Date	:	2017/10/13							
Test Mode	:	Mode 1: Tran	smit (802.11b 1N	Abps) (2437 MHz)					
Frequency		Correct	Reading	Measurement	Margin	Limit			
		Factor	Level	Level					
MHz		dB	dBµV	dBµV/m	dB	dBµV/m			
Horizontal									
Peak Detector	:								
4874.000		2.076	39.901	41.978	-32.022	74.000			
7311.000		9.512	37.359	46.871	-27.129	74.000			
9748.000		9.630	38.784	48.414	-25.586	74.000			
Average Detecto	or:								
Vertical									
Peak Detector	:								
4874.000		2.532	39.518	42.050	-31.950	74.000			
7311.000		10.089	37.651	47.740	-26.260	74.000			
9748.000		10.266	38.931	49.198	-24.802	74.000			

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 120 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product :	MOBILE DA	MOBILE DATA TERMINAL						
Test Item :	Harmonic Ra	diated Emission I	Data					
Test Site :	No.3 OATS							
Test Date :	2017/10/13							
Test Mode :	Mode 1: Tran	smit (802.11b 1N	(19462 MHz) (2462 MHz)					
Frequency	Correct	Reading	Measurement	Margin	Limit			
	Factor	Level	Level					
MHz	dB	dBµV	$dB\mu V/m$	dB	$dB\mu V/m$			
Horizontal								
<b>Peak Detector:</b>								
4924.000	2.191	39.859	42.050	-31.950	74.000			
7386.000	10.373	37.314	47.688	-26.312	74.000			
9848.000	9.964	38.720	48.684	-25.316	74.000			
Average Detector:	:							
Vertical								
<b>Peak Detector:</b>								
4924.000	2.805	39.878	42.683	-31.317	74.000			
7386.000	11.180	37.236	48.416	-25.584	74.000			
9848.000	10.801	38.372	49.173	-24.827	74.000			

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 120 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	: MOBILE DA	TA TERMINAL			
Test Item	: Harmonic Rae	diated Emission I	Data		
Test Site	: No.3 OATS				
Test Date	: 2017/10/13				
Test Mode	: Mode 2: Tran	smit (802.11g 6N	Ibps) (2412MHz)		
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m
Horizontal					
Peak Detector:					
4824.000	2.428	39.821	42.250	-31.750	74.000
7236.000	9.177	37.922	47.099	-26.901	74.000
9648.000	10.019	37.793	47.813	-26.187	74.000
Average Detector	•				
Vertical					
Peak Detector:					
4824.000	2.836	40.448	43.285	-30.715	74.000
7236.000	9.676	38.335	48.011	-25.989	74.000
9648.000	10.556	37.234	47.791	-26.209	74.000

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#### Note:

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 1k Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	MOBILE DATA TERMINAL							
Test Item	:	Harmonic R	Harmonic Radiated Emission Data						
Test Site	:	No.3 OATS							
Test Date	:	2017/10/13							
Test Mode	:	Mode 2: Tra	insmit (802.11g 6	Mbps) (2437 MHz)					
Frequency		Correct	Reading	Measurement	Margin	Limit			
		Factor	Level	Level					
MHz		dB	dBµV	dBµV/m	dB	dBµV/m			
Horizontal									
Peak Detector:									
4874.000		2.076	39.403	41.480	-32.520	74.000			
7311.000		9.512	37.467	46.979	-27.021	74.000			
9748.000		9.630	38.787	48.417	-25.583	74.000			
Average Detector	:								
Vertical									
Peak Detector:									
4874.000		2.532	39.496	42.028	-31.972	74.000			
7311.000		10.089	37.762	47.851	-26.149	74.000			
9748.000		10.266	38.933	49.200	-24.800	74.000			

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 1k Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product :	MOBILE DA	MOBILE DATA TERMINAL						
Test Item :	Harmonic Ra	diated Emission I	Data					
Test Site :	No.3 OATS							
Test Date :	2017/10/13							
Test Mode :	Mode 2: Tran	ısmit (802.11g 6N	(162 MHz) (2462 MHz)					
Frequency	Correct	Reading	Measurement	Margin	Limit			
	Factor	Level	Level					
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m			
Horizontal								
<b>Peak Detector:</b>								
4924.000	2.191	39.316	41.507	-32.493	74.000			
7386.000	10.373	37.301	47.675	-26.325	74.000			
9848.000	9.964	37.987	47.951	-26.049	74.000			
Average Detector:								
Vertical								
<b>Peak Detector:</b>								
4924.000	2.805	37.447	40.252	-33.748	74.000			
7386.000	11.180	37.317	48.497	-25.503	74.000			
9848.000	10.801	38.379	49.180	-24.820	74.000			

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 1k Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	MOBILE DATA TERMINAL
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/13
Test Mode	:	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)(2412MHz)
F		

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	dBµV/m	dB	$dB\mu V/m$
Horizontal					
Peak Detector:					
4824.000	2.428	40.113	42.542	-31.458	74.000
7236.000	9.177	37.157	46.334	-27.666	74.000
9648.000	10.019	37.647	47.667	-26.333	74.000
Average Detector:					
Vertical					
Peak Detector:					
4824.000	2.836	39.813	42.650	-31.350	74.000
7236.000	9.676	37.405	47.081	-26.919	74.000
9648.000	10.556	37.262	47.819	-26.181	74.000

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 1k Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	MOBILE DATA TERMINAL
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/13
Test Mode	:	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m
Horizontal					
<b>Peak Detector:</b>					
4874.000	2.076	40.206	42.283	-31.717	74.000
7311.000	9.512	37.398	46.910	-27.090	74.000
9748.000	9.630	38.528	48.158	-25.842	74.000
Average Detector:					
Vertical					
<b>Peak Detector:</b>					
4874.000	2.532	39.348	41.880	-32.120	74.000
7311.000	10.089	37.964	48.053	-25.947	74.000
9748.000	10.266	38.715	48.982	-25.018	74.000

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 1k Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	MOBILE DATA TERMINAL
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/13
Test Mode	:	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
<b>Peak Detector:</b>					
4924.000	2.191	39.673	41.864	-32.136	74.000
7386.000	11.180	37.841	49.021	-24.979	74.000
9848.000	10.801	38.191	48.992	-25.008	74.000
Average Detector:					
Vertical					
<b>Peak Detector:</b>					
4924.000	2.805	40.028	42.833	-31.167	74.000
7386.000	11.180	37.082	48.262	-25.738	74.000
9848.000	10.801	37.855	48.656	-25.344	74.000

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 1k Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	MOBILE DATA TERMINAL
Test Item	:	General Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/13
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	$dB\mu V/m$
Horizontal					
120.210	-7.275	41.957	34.682	-8.818	43.500
268.620	-5.522	36.461	30.939	-15.061	46.000
410.240	-0.122	38.640	38.519	-7.481	46.000
614.910	2.991	34.604	37.595	-8.405	46.000
800.180	6.417	33.950	40.367	-5.633	46.000
984.480	8.098	33.472	41.570	-12.430	54.000
Vertical					
144.460	-5.503	41.349	35.846	-7.654	43.500
246.310	-5.733	40.389	34.656	-11.344	46.000
409.270	-4.434	36.294	31.860	-14.140	46.000
613.940	1.782	35.827	37.609	-8.391	46.000
819.580	3.001	35.378	38.379	-7.621	46.000
967.990	3.907	33.814	37.721	-16.279	54.000

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 8. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	MOBILE DATA TERMINAL
Test Item	:	General Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/13
Test Mode	:	Mode 2: Transmit (802.11g 6Mbps) (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	$dB\mu V/m$
Horizontal					
102.750	-8.666	42.848	34.182	-9.318	43.500
409.270	0.046	39.353	39.399	-6.601	46.000
512.090	3.184	38.886	42.070	-3.930	46.000
692.510	3.667	34.011	37.678	-8.322	46.000
909.790	6.418	33.552	39.970	-6.030	46.000
983.510	7.887	34.060	41.947	-12.053	54.000
Vertical					
157.070	-5.195	39.088	33.893	-9.607	43.500
377.260	0.647	34.105	34.752	-11.248	46.000
614.910	1.701	34.999	36.700	-9.300	46.000
716.760	-1.321	37.391	36.070	-9.930	46.000
818.610	2.979	34.580	37.559	-8.441	46.000
935.010	2.763	34.157	36.920	-9.080	46.000

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 1k Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 8. No emission found between lowest internal used/generated frequency to 30MHz.



Limit

Product	:	MOBILE DATA TERMINAL						
Test Item	:	General Rad	General Radiated Emission Data					
Test Site	:	No.3 OATS	No.3 OATS					
Test Date	:	2017/10/13	2017/10/13					
Test Mode	:	Mode 3: Tra	nsmit (802.11n M	CS0 7.2Mbps 20M-B	BW) (2437 MHz)			
Frequency		Correct	Reading	Measurement	Margin			
		Factor	Loval	Loval				

	Factor	Level	Level		
MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
144.460	-7.703	38.300	30.597	-12.903	43.500
409.270	0.046	39.257	39.303	-6.697	46.000
545.070	4.555	33.368	37.923	-8.077	46.000
716.760	3.809	37.968	41.777	-4.223	46.000
874.870	5.765	33.190	38.955	-7.045	46.000
1000.000	9.564	32.483	42.047	-11.953	54.000
Vertical					
143.490	-5.525	40.143	34.618	-8.882	43.500
291.900	-5.272	42.790	37.518	-8.482	46.000
512.090	0.604	34.932	35.536	-10.464	46.000
691.540	2.092	33.884	35.976	-10.024	46.000
818.610	2.979	34.076	37.055	-8.945	46.000
930.160	3.830	34.115	37.945	-8.055	46.000

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 1k Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 8. No emission found between lowest internal used/generated frequency to 30MHz.

## 5. **RF** antenna conducted test

## 5.1. Test Setup

## **RF** antenna Conducted Measurement:



## 5.2. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

## 5.3. Test Procedure

The EUT was tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements. Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

## 5.4. Uncertainty

The measurement uncertainty Conducted is defined as  $\pm 1.20$ dB



## 5.5. Test Result of RF antenna conducted test

Product	:	MOBILE DATA TERMINAL
Test Item	:	RF antenna conducted test
Test Site	:	No.3 OATS
Test Date	:	2017/10/05
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps)

## Channel 01 (2412MHz)



#### Channel 06 (2437MHz)





Note: The above test pattern is synthesized by multiple of the frequency range.



Product	:	MOBILE DATA TERMINAL
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	No.3 OATS
Test Date	:	2017/10/05
Test Mode	:	Mode 2: Transmit (802.11g 6Mbps)

#### Channel 01 (2412MHz)



#### Channel 06 (2437MHz)



#### Channel 11 (2462MHz)



Note: The above test pattern is synthesized by multiple of the frequency range.



Product	:	MOBILE DATA TERMINAL
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	No.3 OATS
Test Date	:	2017/10/05
Test Mode	:	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

## Channel 01 (2412MHz)



#### Channel 06 (2437MHz)



#### Channel 11 (2462MHz)



Note: The above test pattern is synthesized by multiple of the frequency range.



## 6. Band Edge

## 6.1. Test Setup



## 6.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

## 6.3. Test Procedure

The EUT was setup according to ANSI C63.10:2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.

The average measurement tested according to KDB 558074 section 12.2.5.3. Reduced VBW averaging across on- and off-times of the EUT transmissions with max hold.

Mode	Duty Cycle	Т	1/T	VBW Setting
802.11 b	0.976	8.19	122	120 Hz
802.11 g	0.865	1.35	741	1k Hz
802.11 n20	0.857	1.26	794	1k Hz

VBW  $\geq 1/T$ :

## 6.4. Uncertainty

- ± 4.08 dB above 1GHz
- ± 4.22 dB below 1GHz



#### 6.5. **Test Result of Band Edge**

Product	:	MOBILE DATA TERMINAL
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/16
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

#### **RF Radiated Measurement (Horizontal):**

Channal No.	Frequency	Correct Factor	Reading Level	<b>Emission Level</b>	Peak Limit	Average Limit	Dogult
Channel No.	(MHz)	(dB)	(dBµV)	(dBµV/m)	(dBµV/m)	$(dB\mu V/m)$	Result
01 (Peak)	2387.100	-2.699	47.790	45.090	74.00	54.00	Pass
01 (Peak)	2390.000	-2.687	44.425	41.738	74.00	54.00	Pass
01 (Peak)	2398.200	-2.663	63.112	60.449	74.00	54.00	Pass
01 (Peak)	2400.000	-2.660	56.547	53.887			
01 (Peak)	2411.000	-2.644	97.100	94.456			
01 (Average)	2386.700	-2.701	39.843	37.142	74.00	54.00	Pass
01 (Average)	2390.000	-2.687	34.244	31.557	74.00	54.00	Pass
01 (Average)	2397.300	-2.664	59.609	56.945	74.00	54.00	Pass
01 (Average)	2400.000	-2.660	51.558	48.898			
01 (Average)	2411.200	-2.643	94.479	91.836			

#### Figure Channel 01:



#### **Figure Channel 01:**

**Horizontal (Average)** 



#### Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.

- Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. 2.
- Average measurements: RBW = 1MHz, VBW = 120 Hz, Sweep: Auto. 3.
- 4. "\*", means this data is the worst emission level.
- Measurement Level = Reading Level + Correct Factor. 5.
- The average measurement was not performed when the peak measured data under the limit of average 6. detection.



Product	:	MOBILE DATA TERMINAL
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/16
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

#### **RF Radiated Measurement (VERTICAL):**

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Average Limit	Docult
Channel No.	(MHz)	(dB)	(dBµV)	(dBµV/m)	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
01 (Peak)	2359.600	-4.054	45.715	41.662	74.00	54.00	Pass
01 (Peak)	2390.000	-4.159	41.318	37.159	74.00	54.00	Pass
01 (Peak)	2397.700	-4.171	55.039	50.868	74.00	54.00	Pass
01 (Peak)	2400.000	-4.171	48.983	44.812			
01 (Peak)	2410.900	-4.169	87.470	83.301			
01 (Average)	2387.500	-4.150	33.128	28.978	74.00	54.00	Pass
01 (Average)	2390.000	-4.159	31.138	26.979	74.00	54.00	Pass
01 (Average)	2397.600	-4.171	50.558	46.387	74.00	54.00	Pass
01 (Average)	2400.000	-4.171	42.936	38.765			
01 (Average)	2411.300	-4.167	84.785	80.617			

Figure Channel 01:





VERTICAL (Average)



- Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
  - 2. Peak measurements: RBW = 1MHz, VBW = 3MHz, Sweep: Auto.
  - 3. Average measurements: RBW = 1MHz, VBW = 120 Hz, Sweep: Auto.
  - 4. "\*", means this data is the worst emission level.
  - 5. Measurement Level = Reading Level + Correct Factor.
  - 6. The average measurement was not performed when the peak measured data under the limit of average detection.



Product	:	MOBILE DATA	TERMINAL
Tiouuer	•	MODILL DIMIN	

- Test Item : Band Edge Data
- Test Site : No.3 OATS
- Test Date : 2017/10/16

Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

#### **RF Radiated Measurement (Horizontal):**

Channal No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Average Limit	Dogult
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	(dBµV/m)	$(dB\mu V/m)$	Result
11 (Peak)	2460.900	-2.623	95.344	92.721			
11 (Peak)	2483.500	-2.601	45.311	42.709	74.00	54.00	Pass
11 (Peak)	2487.200	-2.599	47.888	45.290	74.00	54.00	Pass
11 (Average)	2461.200	-2.623	92.770	90.147			
11 (Average)	2483.500	-2.601	37.949	35.347	74.00	54.00	Pass
11 (Average)	2487.600	-2.598	40.428	37.830	74.00	54.00	Pass

#### Figure Channel 11:

#### Horizontal (Peak)



## Figure Channel 11:

Horizontal (Average)



- Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
  - 2. Peak measurements: RBW = 1MHz, VBW = 3MHz, Sweep: Auto.
  - 3. Average measurements: RBW = 1MHz, VBW = 120 Hz, Sweep: Auto.
  - 4. "\*", means this data is the worst emission level.
  - 5. Measurement Level = Reading Level + Correct Factor.
  - 6. The average measurement was not performed when the peak measured data under the limit of average detection.



- Product : MOBILE DATA TERMINAL
- Test Item : Band Edge Data
- Test Site : No.3 OATS
- Test Date : 2017/10/16

Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

#### **RF Radiated Measurement (VERTICAL):**

Channal No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Average Limit	Dogult
Channel No.	(MHz)	(dB)	(dBµV)	(dBµV/m)	(dBµV/m)	$(dB\mu V/m)$	Result
11 (Peak)	2460.900	-4.037	86.080	82.042			
11 (Peak)	2483.500	-3.966	41.812	37.845	74.00	54.00	Pass
11 (Peak)	2489.100	-3.949	43.511	39.562	74.00	54.00	Pass
11 (Average)	2461.200	-4.036	83.507	79.470			
11 (Average)	2483.500	-3.966	31.742	27.775	74.00	54.00	Pass
11 (Average)	2487.000	-3.956	32.395	28.439	74.00	54.00	Pass

#### Figure Channel 11:

#### **VERTICAL** (Peak)





VERTICAL (Average)



- Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
  - 2. Peak measurements: RBW = 1MHz, VBW = 3MHz, Sweep: Auto.
  - 3. Average measurements: RBW = 1MHz, VBW = 120 Hz, Sweep: Auto.
  - 4. "\*", means this data is the worst emission level.
  - 5. Measurement Level = Reading Level + Correct Factor.
  - 6. The average measurement was not performed when the peak measured data under the limit of average detection.



Product	:	MOBILE DATA TERMINAL
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/18
Test Mode	:	Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

#### **RF Radiated Measurement (Horizontal):**

Channal No.	Frequency	Correct Factor	Reading Level	<b>Emission Level</b>	Peak Limit	Average Limit	Dogult
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	(dBµV/m)	$(dB\mu V/m)$	Result
01 (Peak)	2390.000	-2.687	74.116	71.429	74.00	54.00	Pass
01 (Peak)	2400.000	-2.660	82.558	79.898			
01 (Peak)	2406.800	-2.650	99.441	96.791			
01 (Average)	2390.000	-2.687	52.568	49.881	74.00	54.00	Pass
01 (Average)	2400.000	-2.660	65.779	63.119			
01 (Average)	2404.900	-2.653	88.646	85.993			

#### Figure Channel 01:

#### Horizontal (Peak)





Horizontal (Average)



- Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
  - 2. Peak measurements: RBW = 1MHz, VBW = 3MHz, Sweep: Auto.
  - 3. Average measurements: RBW = 1MHz, VBW = 1k Hz, Sweep: Auto.
  - 4. "\*", means this data is the worst emission level.
  - 5. Measurement Level = Reading Level + Correct Factor.
  - 6. The average measurement was not performed when the peak measured data under the limit of average detection.



Product	:	MOBILE DATA TERMINAL
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/18
Test Mode	:	Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

## **RF Radiated Measurement (VERTICAL):**

Channal No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Average Limit	Dogult
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
01 (Peak)	2390.000	-4.159	66.542	62.383	74.00	54.00	Pass
01 (Peak)	2397.400	-4.171	75.186	71.014	74.00	54.00	Pass
01 (Peak)	2400.000	-4.171	74.854	70.683			
01 (Peak)	2417.700	-4.152	93.298	89.145			
01 (Average)	2390.000	-4.159	46.349	42.190	74.00	54.00	Pass
01 (Average)	2400.000	-4.171	59.046	54.875			
01 (Average)	2419.000	-4.150	82.427	78.278			

## Figure Channel 01:

## VERTICAL (Peak)





**VERTICAL** (Average)



- Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
  - 2. Peak measurements: RBW = 1MHz, VBW = 3MHz, Sweep: Auto.
  - 3. Average measurements: RBW = 1MHz, VBW = 1k Hz, Sweep: Auto.
  - 4. "\*", means this data is the worst emission level.
  - 5. Measurement Level = Reading Level + Correct Factor.
  - 6. The average measurement was not performed when the peak measured data under the limit of average detection.



Product	:	MOBILE DATA TERMINAL
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2016/09/01
Test Mode	:	Mode 2: Transmit (802.11g 6Mbps) (2462MHz)

#### **RF Radiated Measurement (Horizontal):**

Channel No.	Frequency	Correct Factor	Reading Level	<b>Emission Level</b>	Peak Limit	Average Limit	Dogult
	(MHz)	(dB)	(dBµV)	(dBµV/m)	(dBµV/m)	$(dB\mu V/m)$	Result
11 (Peak)	2454.900	-2.628	99.322	96.694			
11 (Peak)	2483.500	-2.601	73.608	71.006	74.00	54.00	Pass
11 (Average)	2455.800	-2.627	88.956	86.329			
11 (Average)	2483.500	-2.601	53.501	50.899	74.00	54.00	Pass

#### Figure Channel 11:

Horizontal (Peak)





Horizontal (Average)



- Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
  - 2. Peak measurements:  $RBW = \hat{1}MHz$ ,  $VBW = \hat{3}MHz$ , Sweep: Auto.
  - 3. Average measurements: RBW = 1MHz, VBW = 1kHz, Sweep: Auto.
  - 4. "\*", means this data is the worst emission level.
  - 5. Measurement Level = Reading Level + Correct Factor.
  - 6. The average measurement was not performed when the peak measured data under the limit of average detection.



Product	:	MOBILE DATA TERMINAL
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/18
Test Mode	:	Mode 2: Transmit (802.11g 6Mbps) (2462MHz)

## **RF Radiated Measurement (VERTICAL):**

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Average Limit	Recult
	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
11 (Peak)	2457.900	-4.047	89.086	85.039			
11 (Peak)	2483.500	-3.966	63.317	59.350	74.00	54.00	Pass
11 (Average)	2455.100	-4.057	79.046	74.990			
11 (Average)	2483.500	-3.966	44.023	40.056	74.00	54.00	Pass

#### Figure Channel 11:

#### VERTICAL (Peak)



## Figure Channel 11:

#### **VERTICAL** (Average)



- Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
  - 2. Peak measurements: RBW = 1MHz, VBW = 3MHz, Sweep: Auto.
  - 3. Average measurements: RBW = 1MHz, VBW = 1kHz, Sweep: Auto.
  - 4. "\*", means this data is the worst emission level.
  - 5. Measurement Level = Reading Level + Correct Factor.
  - 6. The average measurement was not performed when the peak measured data under the limit of average detection.



Test Item	:	Band Edge Data
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Test Site:No.3 OATSTest Date:2017/10/18

Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2412MHz)

## **RF Radiated Measurement (Horizontal):**

Channel No	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Average Limit	Dogult
Channel No.	(MHz)	(dB)	(dBµV)	(dBµV/m)	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
01 (Peak)	2389.100	-2.690	75.114	72.423	74.00	54.00	Pass
01 (Peak)	2390.000	-2.687	74.904	72.217	74.00	54.00	Pass
01 (Peak)	2400.000	-2.660	83.998	81.338			
01 (Peak)	2407.900	-2.648	99.041	96.393			
01 (Average)	2390.000	-2.687	55.769	53.082	74.00	54.00	Pass
01 (Average)	2400.000	-2.660	66.137	63.477			
01 (Average)	2419.800	-2.641	87.963	85.322			

Figure Channel 01:

Horizontal (Peak)





Horizontal (Average)



- Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
  - 2. Peak measurements: RBW = 1MHz, VBW = 3MHz, Sweep: Auto.
  - 3. Average measurements: RBW = 1MHz, VBW = 1k Hz, Sweep: Auto.
  - 4. "\*", means this data is the worst emission level.
  - 5. Measurement Level = Reading Level + Correct Factor.
  - 6. The average measurement was not performed when the peak measured data under the limit of average detection.



Product	:	MOBILE DATA TERMINAL
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/18
Test Mode	:	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2412MHz)

#### **RF Radiated Measurement (VERTICAL):**

Channel No	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Average Limit	Decult
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
01 (Peak)	2389.700	-4.157	69.153	64.995	74.00	54.00	Pass
01 (Peak)	2390.000	-4.159	67.899	63.740	74.00	54.00	Pass
01 (Peak)	2397.800	-4.171	76.877	72.706	74.00	54.00	Pass
01 (Peak)	2400.000	-4.171	75.799	71.628			
01 (Peak)	2405.400	-4.170	92.833	88.663			
01 (Average)	2390.000	-4.159	50.406	46.247	74.00	54.00	Pass
01 (Average)	2400.000	-4.171	60.717	56.546			
01 (Average)	2404.300	-4.171	82.579	78.409			

Figure Channel 01:







**VERTICAL** (Average)



- Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
  2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
  - Average measurements: RBW = 1MHz, VBW = 5 MHz, Sweep: Auto.
     Average measurements: RBW = 1MHz, VBW = 1k Hz, Sweep: Auto.
  - 4. "\*", means this data is the worst emission level.
  - 5. Measurement Level = Reading Level + Correct Factor.
  - 6. The average measurement was not performed when the peak measured data under the limit of average detection.



Product	:	MOBILE DATA	TERMINAL

- Test Item : Band Edge Data
- Test Site : No.3 OATS
- Test Date
   :
   2017/10/18

   Test Mode
   :
   Mode 3: Tra

Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462MHz)

#### **RF Radiated Measurement (Horizontal):**

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Average Limit	Dogult
	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
11 (Peak)	2455.000	-2.628	97.720	95.092			
11 (Peak)	2483.500	-2.601	70.675	68.073	74.00	54.00	Pass
11 (Peak)	2484.100	-2.602	71.382	68.781	74.00	54.00	Pass
11 (Average)	2454.500	-2.628	86.691	84.063			
11 (Average)	2483.500	-2.601	50.684	48.082	74.00	54.00	Pass

Figure Channel 11:

Horizontal (Peak)





- Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
  - 2. Peak measurements: RBW = 1MHz, VBW = 3MHz, Sweep: Auto.
  - 3. Average measurements: RBW = 1MHz, VBW = 1k Hz, Sweep: Auto.
  - 4. "\*", means this data is the worst emission level.
  - 5. Measurement Level = Reading Level + Correct Factor.
  - 6. The average measurement was not performed when the peak measured data under the limit of average detection.



Product	:	MOBILE DATA TERMINAL
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2017/10/18
Test Mode	:	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462MHz)

#### **RF Radiated Measurement (VERTICAL):**

Channal No.	Frequency	Correct Factor	Reading Level	<b>Emission Level</b>	Peak Limit	Average Limit	Dogult
Channel No.	(MHz)	(dB)	(dBµV)	(dBµV/m)	$(dB\mu V/m)$	$dB\mu V/m$ ( $dB\mu V/m$ )	
11 (Peak)	2455.500	-4.054	87.065	83.011			
11 (Peak)	2483.500	-3.966	60.566	56.599	74.00	54.00	Pass
11 (Average)	2454.900	-4.056	75.271	71.215			
11 (Average)	2483.500	-3.966	40.604	36.637	74.00	54.00	Pass

#### Figure Channel 11:

#### **VERTICAL (Peak)**



## Figure Channel 11:

#### **VERTICAL** (Average)



- Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
  - 2. Peak measurements: RBW = 1MHz, VBW = 3MHz, Sweep: Auto.
  - 3. Average measurements: RBW = 1MHz, VBW = 1kHz, Sweep: Auto.
  - 4. "\*", means this data is the worst emission level.
  - 5. Measurement Level = Reading Level + Correct Factor.
  - 6. The average measurement was not performed when the peak measured data under the limit of average detection.



Product	:	MOBILE DATA TERMINAL
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps)

Test Frequency	Measurement Level	Limit	Result
(MHz)	$\Delta$ (dB)	$\Delta$ (dB)	
2412	48.618	>20	PASS
2462	53.331	>20	PASS

Keysight Spectrum Analyzer - Swep	et SA					
Center Freq 2.390000	AC DOOD GHz	SENSE:IN	Avg Type:	LIGN AUTO 02:35:03 P Log-Pwr TRAI 100/100 TY	M Oct 23, 2017 CE 1 2 3 4 5 6	Frequency
	PNO: Fast G IFGain:Low	#Atten: 20 dB	Avginoid.>	Mkr1 2 41		Auto Tune
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-9.50					-14.79 dBm	2.390000000 GHz
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-39.6		J	v <sup>r™</sup> ¥2	- Wymy	u	2.340000000 GHz
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-69.5 Marshaman	كالبستوجيين كالماليط والملهدة المطراهين	-				Stop Freq
-79.5						2.44000000 GHz
Center 2.39000 GHz	#VBV	( 300 kHz		Span 1	00.0 MHz	CF Step
MKR MODE TRC SCL	ж (В)	Y 100 KH2	FUNCTION FUNC	TION WDTH FUNCTI	ON VALUE	Auto Man
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3 4						0 Hz
6 7						
8						
10						
MSG				STATUS	,	

🚺 Keysight S	pectrum	Analyzer - Swe	ept SA								- # <b>*</b>
Center l	R# Freq	50 R 2.48350	AC 0000 GH	z	SEI	NSE:INT	Avg Typ	ALIGN AUTO	02:43:13 P TRAI	M Oct 23, 2017	Frequency
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0.500 -9.50		/	p.M.	1. 						-13.25 dBff	Center Freq 2.483500000 GHz
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-59.5 -69.5 -79.5						¥ 1.		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	and a second	- Annal - Annal	Stop Freq 2.533500000 GHz
Center 2 #Res BV	.4835 / 100	60 GHz kHz		#VBV	V 300 kHz			Sweep 9	Span 1 .600 ms (	00.0 MHz 1001 pts)	CF Step 10.000000 MHz Auto Man
MKR MODE 1 N 2 N	IRC SCI 1 f 1 f		2.462 5 2.483 5	5 GHz	6.754 dl	Bm Bm	ETION	NCTION WIDTH	FUNCTI	ON VALUE	
3 4 5										E	Freq Offset 0 Hz
6 7 8 9	-										
10	+										
MSG								STATUS	6		



- Test Item Band Edge :
- Test Site : No.3 OATS
- Test Mode

Mode 2: Transmit (802.11g 6Mbps) :

Test Frequency	Measurement Level	Limit	Result
(MHz)	$\Delta$ (dB)	$\Delta$ (dB)	
2412	21.749	>20	PASS
2462	32.585	>20	PASS

🊺 Ke	ysight Sp	ectrum	Analyz	er - Swe	pt SA														_	
Cen	ter F	req	۶ 2.3	50 Q 9000	AC 0000	GH	z	_	SE Trin: Fra	NSE:1	NT[	Avg	Type	LIGN AUTO	02:33	TRAC	E 1 2 3	1017 4 5 6	F	requency
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-29.5 -39.5 -49.5							الحصا	M	and a start	- And			_			***	YARANINA YARA	54	2.34	Start Freq 40000000 GHz
-69.5 -69.5 -79.5	1		****		Jumma	2.194	AN .						_					_	2.4	Stop Freq 40000000 GHz
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🊺 Keysight Spe	ectrum Analyzer - Swe	ept SA								
Center F	RF 50 Ω req 2.48350	AC		SEN	SE:INT	Avg Ty	ALIGN AUTO	02:41:49 PI TRAC	Coct 23, 2017	Frequency
10 dB/div	Ref Offset 0.5	PNO: IFGair 5 dB dBm	Fast 😱 n:Low	#Atten: 20	) dB	Avginoi	Mk	r1 2.457 3.92	0 GHz	Auto Tune
0.500 -9.50		- Lingh	mu (	Wheel	2				-16.08 dBm	Center Freq 2.483500000 GHz
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-69.5 -69.5 -79.5								and the stand of the stand	hill,	Stop Freq 2.533500000 GHz
Center 2. #Res BW	48350 GHz 100 kHz	×	#VBW	300 kHz	FUN	TION	Sweep 9	Span 1 .600 ms (	00.0 MHz 1001 pts)	CF Step 10.000000 MHz Auto Man
1 N 1 2 N 1 3 4 5	f	2.457 0 G 2.483 5 G	jHz jHz	3.920 dB -28.665 dB	im im					Freq Offset 0 Hz
7 8 9 10 11			-		=					
MSG				HI.			STATUS	6	,	



Product	:	MOBILE DATA TERMINAL
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

Test Frequency	Measurement Level	Limit	Result
(MHz)	$\Delta$ (dB)	$\Delta$ (dB)	
2412	23.457	>20	PASS
2462	31.865	>20	PASS

🊺 Kej	/sight	Spectru	ım A	nalyzer - Sw	vept	5A															
Cen	tor	Ere	RF	50 S	2	100 C	211	7		1	SENSE:	INT	Ava	Type	ALIGN AUTO	) ( r	2:36:14 P TRA	M Oct 2	3,2017	5	Frequency
10 df	B/div	, F	Ref	Offset 0.	5 d dB	Bm	PN	O: Fas ain:Lo	w w	Trig: Fr #Atten:	20 di	un B	Avg	Hold:	:>100/100 M	lkr1	2.40 1.9	7 0 ( 70 d	GHz		Auto Tune
Log 0.500 -9.50 -19.5												أنعده	2	●1 1	yna	m (	ω.	-10	1.03 dBm		Center Fre 2.390000000 GH
-29.5 -39.5 -49.5									paul be	1 Martin Mark	and a	here					all a start	eld-rang	V <sub>ru</sub> ya		Start Fre 2.340000000 GH
-69.5 -69.5 -79.5	****	nLopue	-	and	*	مايەسىيە		h.v.													Stop Fre 2.44000000 GH
Cen #Re	ter s Bl	2.39 W 10		) GHz kHz				#\	/BW	/ 300 kH	Iz			ę	Sweep	9.60	Span 1 0 ms (	100.0 (1001	MHz pts)		CF Ste 10.000000 MH
MKR 1 2 3 4 5	NODE N	TRC 1	f f			× 2.4( 2.4)	07 0 00 0	GHz GHz		1 <u>.970</u> -21.487	dBm dBm	FUN	TION	FUN	ICTION WDT		FUNCT	ION VALU	JE		Freq Offse 0 H
6 7 8 9 10 11																					
MSG															STAT	us			,	L	

🊺 Keysight Sp	ectrum Analyzer - Si	wept SA								- # <b></b>
Center F	RF 50 € req 2.4835	R AC 00000 GH	Iz	SET	NSE:INT	Avg Typ	ALIGN AUTO	02:40:38 P TRAI	M Oct 23, 2017 DE 1 2 3 4 5 6	Frequency
10 dB/div	Ref Offset 0 Ref 10.50	I.5 dB	IO: Fast G	#Atten: 2	0 dB	Avginoid	Mk	ن r1 2.45 3.1	7 0 GHz 06 dBm	Auto Tune
0.500 -9.50			min		,				-16.89 dBm	Center Freq 2.483500000 GHz
-29.5	and the second second			BUYLUNG BERBY	2 14	wheel at sold but				Start Freq 2.433500000 GHz
-69.5 -69.5 -79.5							n na shekaratika s	When and the second	www.hun	Stop Freq 2.533500000 GHz
Center 2. #Res BW	48350 GHz 100 kHz		#VBV	N 300 kHz			Sweep 9.	Span 1 .600 ms (	00.0 MHz 1001 pts)	CF Step 10.000000 MHz Auto Mar
1 N 2 N 3 4 5	f f	2.457 (	0 GHz 5 GHz	3.106 dE -28.750 dE	Bm Bm			PORCH	======================================	Freq Offse
6 7 8 9 10 11			=							
MSG							STATUS		•	



## 7. 6dB Bandwidth

## 7.1. Test Setup



#### 7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

## 7.3. Test Procedure

The EUT was setup according to ANSI C63.4: 2014; tested according to DTS test procedure of Jan KDB558074 for compliance to FCC 47CFR 15.247 requirements.

## 7.4. Uncertainty

± 283Hz



## 7.5. Test Result of 6dB Bandwidth

Product	:	MOBILE DATA TERMINAL
Test Item	:	6dB Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	8650	>500	Pass
06	2437	8700	>500	Pass
11	2462	8650	>500	Pass

#### 🚺 Keysight Spectrum Analyzer - Swept SA X RL RF 50 Ω AC 05:18:00 PM Oct 05, 2017 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N Center Freq 2.412000000 GHz PN0: Fast IFGain:Low SENSE:INT ALIGN AUTO Frequency Avg Type: Log-Pwr Trig: Free Run #Atten: 30 dB Auto Tune Mkr2 2.407 90 GHz Ref Offset 0.5 dB Ref 20.50 dBm -1.69 dBm 10 dB/div Log 1 10.5 **Center Freq ≜**2 A NA A -0.14 dB ).500 2.412000000 GHz -9.50 -19.5 Start Freq -29.5 2.387000000 GHz M -39.5 M JJL وبالرم 'nn 49.5 Stop Freq were -59.5 2.437000000 GHz -69.6 Span 50.00 MHz Sweep (#Swp) 4.800 ms (1001 pts) Center 2.41200 GHz #Res BW 100 kHz CF Step 5.000000 MHz #VBW 300 kHz Auto Man MKR MODE TRC SCL 1 N 1 f 2 N 1 f 3 N 1 f EUNCTION WIDTH FUNCTION FUNCTION VALUE ^ 2.412 50 GHz 2.407 90 GHz 2.416 55 GHz 5.86 dBm -1.69 dBm -0.62 dBm Freq Offset 0 Hz 9 10 11 STATUS

#### Figure Channel 01:



🎉 Keysight Sp	ectrum Analyz	er - Swept S	SA								
Center F	<sup>RF</sup> req 2.43	50 Ω A 370000	AC   DOO GH	z	SEN	Run	Avg Type	LIGN AUTO	05:20:56 P	M Oct 05, 2017	Frequency
10 dB/div	Ref Offs Ref 20	set 0.5 dl	B m	o: Fast ⊆ ain:Low	#Atten: 30	) dB		Mkr	2 2.432 -1.	90 GHz 06 dBm	Auto Tune
10.5 0.500				AN.	2 marrier	1	3			0.51 dBm	Center Freq 2.437000000 GHz
-19.5 -29.5 -39.5		w pu		M. M. M.				un	wi July		<b>Start Freq</b> 2.412000000 GHz
-49.5 -59.5 -69.5	New Y	,	V							hanna parta	<b>Stop Freq</b> 2.462000000 GHz
Center 2. #Res BW	43700 G 100 kHz	Hz	X	#VBW	300 kHz	FUNC	Sweep (	#Swp) 4.	Span 5 800 ms (	0.00 MHz 1001 pts)	<b>CF Step</b> 5.000000 MHz <u>Auto</u> Man
1 N 2 N 3 N 4 5 6			2.437 50 2.432 90 2.441 60	) GHz ) GHz ) GHz	6.51 dE -1.06 dE -1.30 dE	3m 3m 3m			FUNCTION		Freq Offset 0 Hz
7 8 9 10 11 <											
MSG								STATUS			<u>.</u>

#### **Figure Channel 06:**

#### **Figure Channel 11:**





Product	:	MOBILE DATA TERMINAL
Test Item	:	6dB Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	16450	>500	Pass
06	2437	16450	>500	Pass
11	2462	16450	>500	Pass

## Figure Channel 01:

💓 Keysight S	pectrum Analyzer - Swe	ept SA						
Center F	RF 50 Ω	AC 00000 GHz	SEN	SE:INT Avg Ty	ALIGN AUTO	05:27:56 PI TRAC	HOct 05, 2017	Frequency
10 dB/div	Ref Offset 0.5	PNO: Fast IFGain:Low dB <b>JBm</b>	#Atten: 30	Run dB	Mkr	2 2.403 -3.2	75 GHz 24 dBm	Auto Tune
Log 10.5 0.500 -9.50		<u></u>	1 Interneting	And and a factor of a	3		-2.15 dBm	Center Freq 2.412000000 GHz
-19.5 -29.5 -39.5	and the second	progentrutuilly rear			M. M. Wellington open of	Weber What with	hann warn	<b>Start Freq</b> 2.387000000 GHz
-49.5 -59.5 -69.5								<b>Stop Freq</b> 2.437000000 GHz
Center 2 #Res BW	.41200 GHz / 100 kHz	#V	BW 300 kHz	Sweep	o (#Swp) 4	Span 5 .800 ms (	0.00 MHz 1001 pts)	CF Step 5.000000 MHz <u>Auto</u> Man
MXR         MODE           1         N           2         N           3         N           4         5           6         7           8         9           10         11           <	IRC SCL 1 f 1 f 1 f 	x 2.403 75 GHz 2.403 75 GHz 2.420 20 GHz	¥ 3.85 dB -3.24 dB -2.56 dB	FUNCTION T m m m				Freq Offset 0 Hz
MSG					STATUS	5		

🊺 Keysight Spe	ctrum Analyzer - Swe	pt SA				
Center F	RF 50 Ω req 2.43700	AC 0000 GHz	SENSE:INT	ALIGN A Avg Type: Log-	AUTO 05:30:43 PM Oct 05, 2017 Pwr TRACE 1 2 3 4 5 TYPE M MAAAAAAA	Frequency
10 dB/div	Ref Offset 0.5 <b>Ref 20.50 d</b>	dB	#Atten: 30 dB	I	DET P NNNN Mkr2 2.428 80 GHz -1.51 dBm	Auto Tune
10.5 0.500		2	Lot - Contral - Contral		-1.37.dBn	Center Freq 2.437000000 GHz
-19.5 -29.5 -39.5	willy approximate	and			Trinsbolly all a strateging for a strate	<b>Start Freq</b> 2.412000000 GHz
-49.5 -59.5 -69.5						<b>Stop Freq</b> 2.462000000 GHz
Center 2. #Res BW	43700 GHz 100 kHz	#VE	3W 300 kHz	Sweep (#Sw	Span 50.00 MHz p) 4.800 ms (1001 pts	CF Step 5.000000 MHz Auto Man
1 N 1 2 N 1 3 N 1 4 5 6		2.442 00 GHz 2.428 80 GHz 2.445 25 GHz	4.63 dBm -1.51 dBm -2.21 dBm			Freq Offset 0 Hz
7 8 9 10 11 •						

## Figure Channel 06:

## Figure Channel 11:

🔤 Keysight Spectrum Analyze	er - Swept SA				
Center Freq 2.46	50 Ω AC 2000000 GHz	SENSE:INT	ALIGN AI Avg Type: Log-F	UTO 02:47:29 AM Oct 19, 2017 Pwr TRACE 1 2 3 4 5 6 TYPE M WWWWWW	Frequency
Ref Offse 10 dB/div Ref 20.	PNO: Fast IFGain:Low et 0.5 dB 50 dBm	#Atten: 30 dB	N	<sub>Det</sub> P NNNNN Ikr2 2.453 75 GHz -3.36 dBm	Auto Tune
10.5 0.500			here frank 3	DL1-2.95 dBm	Center Freq 2.462000000 GHz
-19.5 -29.5 -39.5	white an weight and the		hand have been been been been been been been be	Souther attack With the general states of the second states of the secon	<b>Start Freq</b> 2.437000000 GHz
-49.5 -59.5 -69.5					<b>Stop Freq</b> 2.487000000 GHz
Center 2.46200 GH #Res BW 100 kHz	Hz #VE	300 kHz	Sweep (#Swp	Span 50.00 MHz ) 4.800 ms (1001 pts)	CF Step 5.000000 MHz Auto Man
MKR         MODE         TRC         SCL           1         N         1         f           2         N         1         f           3         N         1         f           4	x 2.457 00 GHz 2.453 75 GHz 2.470 20 GHz	Y F 3.95 dBm -3.36 dBm -2.56 dBm			Freq Offset
7           8           9           10           11					Scale Type
<		m	, IL e	TATUS	



Test Item :	6dB Bandwidth Data
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Test Site : No.3 OATS

Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	17650	>500	Pass
06	2437	17700	>500	Pass
11	2462	17400	>500	Pass

## Figure Channel 01:

🎉 Keysight Spectrum Analyzer - Swept SA				
	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	05:37:37 PM Oct 05, 2017 TRACE 1 2 3 4 5 6	Frequency
Ref Offset 0.5 dB Ref 20 50 dBm	Trig: Free Run #Atten: 30 dB	Mkr	2 2.403 15 GHz -3.82 dBm	Auto Tune
		3	-2.67 dBm	Center Freq 2.412000000 GHz
-19.5 -29.5		ראנהט (איזיקטערט איז	squeeningungungungungung	<b>Start Freq</b> 2.387000000 GHz
-49.5				<b>Stop Freq</b> 2.437000000 GHz
Center 2.41200 GHz #Res BW 100 kHz #V	BW 300 kHz	Sweep (#Swp) 4.	Span 50.00 MHz 800 ms (1001 pts)	<b>CF Step</b> 5.000000 MHz <u>Auto</u> Man
MRR Model TR         Sect         x           1         N         1         f         2.407.00 GHz           2         N         1         f         2.407.00 GHz           3         N         1         f         2.407.00 GHz           3         N         1         f         2.407.00 GHz           4         -         -         -         -           5         -         -         -         -           6         -         -         -         -           7         -         -         -         -         -           8         -         -         -         -         -         -           9         -	Y FUNC 3.33 dBm -3.82 dBm -2.76 dBm	FUNCTION WIDTH		Freq Offset 0 Hz
< MSG	m	STATUS	•	



🊺 Keysigl	ht Spectr	um Ai	nalyzer - Swe	pt SA								
Cente	r Fre	RF q2	50 Ω .43700	AC 0000 G	Iz	SE Tria: Fre	NSE:INT	Avg Typ	ALIGN AUTO e: Log-Pwr	05:40:29 P TRAC	M Oct 05, 2017	Frequency
10 dB/d	PN0: tast ↓ mg. rest data IFGain:Low #Atten: 30 dB Ref Offset 0.5 dB dB/div Ref 20.50 dBm -3.72 dBm -3.72 dBm										Auto Tune	
Log 10.5 0.500					<b>∮</b> <sup>2</sup> ,	<del>selselynhyd</del> a.			3		-1.46 dBm	Center Freq 2.437000000 GHz
-19.5	A WWW	minu	נייזיאיניזיקיטיז נייזיאיניזיקיטיז	wanga kalawadaa				۰ ۱	- Mary Mary	ageneration and a second	MUMUL May and	<b>Start Freq</b> 2.412000000 GHz
-49.5 — -59.5 — -69.5 —												<b>Stop Freq</b> 2.462000000 GHz
Center #Res E	r 2.43 3W 1	700 00 k	) GHz (Hz	×	#VB	W 300 kHz	FI	Sweep	(#Swp) 4	Span 5 .800 ms (	0.00 MHz 1001 pts)	CF Step 5.000000 MHz <u>Auto</u> Man
1 N 2 N 3 N 4 5	1 1	f f f		2.442 ( 2.428 2.445 (	00 GHz 15 GHz 85 GHz	4.54 d -3.72 d -2.77 d	Bm Bm Bm				E	Freq Offset
8 9 10 11												
MSG		_							STATU	3	4	

## Figure Channel 06:

## Figure Channel 11:

🊺 Key	sight S	Spectr	um A	nalyzer - Swe	pt SA								- d <b>-</b>
Cent	ter	Fre	RF q 2	50 Ω 2.46200	AC 0000 GI	Hz	SE	NSE:INT	Avg Typ	ALIGN AUTO	05:43:55 P TRAC	M Oct 05, 2017	Frequency
10 dE	3/div		Ref Ref	Offset 0.5 20.50 d	dB IBm	PNO: Fast Gain:Low	#Atten: 3	o dB		Mkı	2 2.453 -3.	15 GHz 01 dBm	Auto Tune
10.5 0.500 -9.50							1			3		-2.18 dBm	Center Freq 2.462000000 GHz
-19.5 -29.5 -39.5	-nwif	"Inders	YUW V	www.www.	on an property	Ward					**************************************	white doold by	<b>Start Freq</b> 2.437000000 GHz
-49.5 -59.5 -69.5													<b>Stop Freq</b> 2.487000000 GHz
Cent #Res	ter 2 s BV	2.46 N 1	20 00	0 GHz kHz		#VI	BW 300 kHz		Sweep	(#Swp) 4	Span 5 .800 ms (	0.00 MHz 1001 pts)	CF Step 5.000000 MHz Auto Man
MKR 1 1 2 3 4 5 6 7 8 9 10 11 <		1 1 1			X 2.457 ( 2.453 1 2.470 5	00 GHz 15 GHz 55 GHz	Y 3.82 d -3.01 d -2.69 d	Bm Bm Bm Bm 	FUNCTION	UNCTION WIDTH			Freq Offset 0 Hz
MSG										STATU	s		



## 8. **Power Density**

## 8.1. Test Setup



## 8.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

## 8.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

#### 8.4. Uncertainty

 $\pm$  1.20 dB



## 8.5. Test Result of Power Density

Product	:	MOBILE DATA TERMINAL
Test Item	:	Power Density Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	5.760	$\leq$ 8dBm	Pass
06	2437	6.500	$\leq$ 8dBm	Pass
11	2462	6.920	$\leq$ 8dBm	Pass

## Figure Channel 01:

🊺 Key	ysight Spec	trum Analyzer - Swe	ept SA								
Cen	ter Fro	RF 50 Ω eq 2.41200	AC 0000 G	Hz	SEI	NSE:INT	Avg Type	ALIGN AUTO : Log-Pwr	05:18:21 P	E 1 2 3 4 5 6	Frequency
10 dE	3/div	Ref Offset 0.5 Ref 20.50 c	F IF 5 dB <b>1Bm</b>	NO: Fast 🕞 Gain:Low	d Trig: Free #Atten: 3	e Run 0 dB		Mkr1	2.412 5 5.	06 GHz 76 dBm	Auto Tune
10.5				ο Λ Λ	٨٩٨		ΛΛΛ				Center Freq 2.412000000 GHz
0.500 -9.50	1	- m							ny	$\sim$	<b>Start Freq</b> 2.405512500 GHz
-19.5 -29.5											<b>Stop Freq</b> 2.418487500 GHz
-39.5											<b>CF Step</b> 1.297500 MHz <u>Auto</u> Man
-49.5											Freq Offset 0 Hz
-69.5	tor 2.4	12000 CH2							Snap 1	2 09 BALL-	
#Res	s BW 1	00 kHz		#VBW	300 kHz		Sweep (	#Swp) ′	span 1 1.267 ms (	2.96 MHZ 1001 pts)	
mod								SIAIU	3		



🊺 Key	ysight Spe	ctrum Analyzer - Swe	ept SA								
Cen	ter Fr	RF 50 Ω eq 2.43700	AC 00000 GH	lz	SEI	Run	Avg Type	LIGN AUTO	05:21:17 PM TRAC	E 1 2 3 4 5 6	Frequency
10 dE	3/div	Ref Offset 0.5 Ref 20.50 c	edB IBm	NO: Fast C	#Atten: 3	0 dB		Mkr1	2.437 4 6.4	96 GHz 50 dBm	Auto Tune
10.5				Λ Λ.Λ	M	1-	~^^ ^	Δο			Center Freq 2.437000000 GHz
0.500 -9.50	M	M	-A-A-					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	hng		<b>Start Freq</b> 2.430475000 GHz
-19.5 -29.5											<b>Stop Freq</b> 2.443525000 GHz
-39.5											<b>CF Step</b> 1.305000 MHz <u>Auto</u> Man
-49.5											Freq Offset 0 Hz
-69.5 Cen	ter 2.4	37000 GHz							Span 1	3.05 MHz	
#Re: MSG	SBW	100 KHZ		#VBW	300 KHZ		sweep (	#SWP) 1 STATUS	.267 ms (	1001 pts)	

#### Figure Channel 06:

#### Figure Channel 11:





Test Item	:	Power Density Data
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Test Site : No.3 OATS

Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	3.880	$\leq$ 8dBm	Pass
06	2437	4.590	$\leq$ 8dBm	Pass
11	2462	3.910	$\leq$ 8dBm	Pass

## Figure Channel 01:

Keysight Spe	ctrum Analyzer - Swe	pt SA								
a RL Center Fr	RF 50 Ω		7	SEI	NSE:INT	Avg Type	ALIGN AUTO	05:28:16 PM TRAC	Oct 05, 2017	Frequency
	092.41200	PN	LO:Fast ⊂ Gain:Low	Trig: Free #Atten: 3	eRun 0 dB		Mkr			Auto Tun
I0 dB/div	Ref Offset 0.5 Ref 20.50 d	dB Bm					IVINI	3.3	38 dBm	
10.5			1							Center Fre 2.412000000 GH
500		munin	mont man	monthing	prontern	hunn	broken	n n huy		Start Fre
3.50	an an Walk			l				hours a		2.399662500 GH
9.5 YLAV	1419 · ·							. 4V	Wy wy wyk	Stop Fre 2.424337500 G⊦
9.5										CF Ste 2.467500 Mł Auto Ma
9.5										
9.5										Freq Offs 0 H
19.5										
enter 2.4 Res BW	1200 GHz 100 kHz		#VBW	300 kHz	<u> </u>	Sweep (	#Swp) :	Span 24 2.400 ms (	4.68 MHz 1001 pts)	
ISG							STATU	IS		L



🊺 Ke	ysight Spe	ctrum Analyzer - Sw	rept SA								
Cer	L Iter Fr	req 2.43700	AC 00000 GH	lz	SEI	NSE:INT	Avg Type	ALIGN AUTO : Log-Pwr	05:31:03 Pr TRAC	HOct 05, 2017 E 1 2 3 4 5 6 E M WWWWW	Frequency
10 di	B/div	Ref Offset 0.0 Ref 20.50	5 dB d <b>B</b> m	NO: Fast C	#Atten: 3	0 dB		Mkr	<sup>ته</sup> 1 2.441 9 4.	84 GHz 59 dBm	Auto Tune
10.5								1			Center Freq 2.437000000 GHz
0.500 -9.50		- mil	from the send	northand	handrun	portrom	www.www.	╟┉╒┯┉╢┶╺┉	Phone	λ	<b>Start Freq</b> 2.424662500 GHz
-19.5 -29.5	yan Min	Ar.1.V.4~"							· · ·	"MVVJAAN	<b>Stop Freq</b> 2.449337500 GHz
-39.5											CF Step 2.467500 MHz <u>Auto</u> Man
-49.5											Freq Offset 0 Hz
-69.5 Cen	ter 2.4	3700 GHz							Span 2	4.68 MHz	
#Re <sup>MSG</sup>	s BW	100 KHZ		#VBW	300 KHz		Sweep (	( <b>#Swp)</b> Stat	2.400 ms (	1001 pts)	

## Figure Channel 06:

## Figure Channel 11:

🔤 Ke	ysight Spe	ctrum Analyzer - Sv	vept SA									d X
Cen	ter Fr	req 2.4620	00000 GH	lz	SET	Bun	Avg Type	Log-Pwr	02:47:49 Af TRAC	HOct 19, 2017 E 1 2 3 4 5 6 E M WWWW	Frequen	юу
10 di	3/div	Ref Offset 0. Ref 20.50	5 dB dBm	Gain:Low	#Atten: 3	0 dB		Mkr	<sup>۵۵</sup> 1 2.456 9 3.9	91 GHz 91 dBm	Auto	Tune
10.5				1							Cente 2.46200000	<b>r Freq</b> 00 GHz
0.500 -9.50			Providencent	modmand	hantray	manhan	lower longer	man bas			Star 2.44966250	<b>t Freq</b> 00 GHz
-19.5 -29.5	<u>sha</u> fti	<u> </u>							(L <sub>1</sub> )///		<b>Stor</b> 2.47433750	<b>o Freq</b> 00 GHz
-39.5											CF 2.46750 <u>Auto</u>	<b>5 Step</b> 00 MHz Man
-59.5											Freq	Offset 0 Hz
-69.5											Scale	туре
Cen #Re	ter 2.4 s BW	6200 GHz 100 kHz		#VBW	300 kHz	_	Sweep (	#Swp)	Span 2 2.400 ms (	4.68 MHz 1001 pts)	Log	Lin
MSG								🚺 STATU	JS			



Product	:	MOBILE DATA TERMINAL
Test Item	:	Power Density Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	3.340	$\leq$ 8dBm	Pass
06	2437	4.630	$\leq$ 8dBm	Pass
11	2462	3.830	$\leq$ 8dBm	Pass

## Figure Channel 01:

🇾 Ke	eysight Spectr	rum Analyzer - Sw	rept SA								
LXI R	L Fro	RF 50 Ω		1-	SEI	NSE:INT		ALIGN AUTO	05:37:57 PI	M Oct 05, 2017	Frequency
Cer		Ref Officet 01		⊓∠ NO: Fast ⊂⊾ Gain:Low	Trig: Free #Atten: 3	e Run 0 dB		Mkr	1 2.406 9		Auto Tune
10 d Log	B/div	Ref 20.50	dBm		1	1	1	1	3.	34 dBm	
10.5				<b>▲</b> 1							Center Fred 2.412000000 GHz
0.500 -9.50		ſ	aland from	whenthe	Anntony	produced	marsh with	hontwo	twing		Start Fred 2.398762500 GHz
-19.5	ᢣᠬᡘ᠕ᠰ	Numer							Vuly	NANA WAVY	Stop Frec 2.425237500 GH;
-29.5											<b>CF Step</b> 2.647500 MH: <u>Auto</u> Mar
-49.5											Freq Offse 0 H:
-69.5											
Cen #Re	ter 2.41 s BW 10	200 GHz 00 kHz		#VBW	300 kHz		Sweep	#Swp)	Span 2 2.533 ms (	6.48 MHz 1001 pts)	
MSG								STAT	US		



🊺 Ke	ysight Spe	ctrum Analyzer - Sw	ept SA								
<mark>⊯</mark> R Cer	ter Fr	eq 2.43700	AC 00000 GH	lz	SEI	NSE:INT	Avg Type	LIGN AUTO	05:40:50 Pf TRAC	HOct 05, 2017 E 1 2 3 4 5 6 E M WWWWW	Frequency
10 d	3/div	Ref Offset 0.5 Ref 20.50 (	o dB Bm	NO: Fast Gain:Low	#Atten: 3	0 dB		Mkr	1 2.441 9 4.	91 GHz 63 dBm	Auto Tune
10.5							•	1			Center Freq 2.437000000 GHz
0.500 -9.50		- Andrew Contraction of the cont	Manha	haindand	howby	harden	www.lv	top Armond			<b>Start Freq</b> 2.423725000 GHz
-19.5	<u>a</u> w	pphymener								WHAT WANT	<b>Stop Freq</b> 2.450275000 GHz
-39.5											CF Step 2.655000 MHz <u>Auto</u> Man
-49.5											Freq Offset 0 Hz
-69.5 Cen	ter 2.4	3700 GHz		<i>#</i> ) (D)4				(# <b>0</b>	Span 2	6.55 MHz	
#Re MSG	SDW			#VBW	300 KHZ		Sweep (	statu	2.000 MS (	iour pts)	

#### Figure Channel 06:

## Figure Channel 11:

🊺 Ke	ysight Spe	ctrum Analyzer - Sw	ept SA								
<mark>⊯</mark> R Cer	L Iter Fr	req 2.46200	AC 00000 GH	lz	SEI	NSE:INT	Avg Type	Log-Pwr	05:44:16 PI TRAC	M Oct 05, 2017	Frequency
10 di	B/div	Ref Offset 0.5 Ref 20.50 (	o dB Bm	NO: Fast 🕞 Gain:Low	#Atten: 3	0 dB		Mkr1 2	2.456 98 3.	8 8 GHz 83 dBm	Auto Tune
10.5				• <sup>1</sup>							Center Freq 2.462000000 GHz
0.500 -9.50		- AN	Manhap	the second second	harrollow	matur	multi	malmost	him,		<b>Start Freq</b> 2.448950000 GHz
-19.5 -29.5	4andi								. Vull	W-DALAN	<b>Stop Freq</b> 2.475050000 GHz
-39.5											CF Step 2.610000 MHz <u>Auto</u> Man
-59.5											Freq Offset 0 Hz
-69.5 Cen	ter 2.4	6200 GHz							Span 2	6.10 MHz	
#Re <sup>мsg</sup>	s BW	100 kHz		#VBW	300 kHz		Sweep	<b>#Swp)</b> Statu	2.533 ms ( s	1001 pts)	



## 9. EMI Reduction Method During Compliance Testing

No modification was made during testing.