

### FCC PART 15 SUBPART C TEST REPORT

### FCC PART 15.247

Report Reference No	MWR150900605	
FCC ID	RQQHLT-L40SCL	
Compiled by	File administrators Martin Ao	Manain
( position+printed name+signature):		/ vionen.
Supervised by		War have was a
( position+printed name+signature):	Test Engineer Yuchao Wang	
Approved by ( position+printed name+signature):	Manager Dixon Hao	Dixon
Date of issue	Sep 22, 2015	
Representative Laboratory Name .:	Maxwell International Co., Ltd.	
Address	Room 509, Hongfa center building, Guangdong, China	Baoan District, Shenzhen,
Testing Laboratory Name	CCIC Southern Electronic Produc Ltd.	t Testing (Shenzhen) Co.,
Address	Electronic Testing Building, Shahe F District, Shenzhen, 518055, P. R. Ch	Road, Xili, Nanshan nina
Applicant's name	HYUNDAI CORPORATION	
Address	140-2, Kye-dong, Chongro-ku, Seou	II, South Korea
Test specification:		
Standard	FCC Part 15.247: Operation withi 2400-2483.5 MHz and 5725-5850 M	n the bands 902-928 MHz, /Hz
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Test item description	Mobile Phone	
Trade Mark	HYUNDAI	
Manufacturer	Skycom Telecommunications Co.	., Limited
Model/Type reference	L445	
Listed Models	N/A	
Modulation Type	DSSS(CCK,DQPSK,DBPSK),OFDN BPSK)	/(64QAM,16QAM,QPSK,
Operation Frequency	From 2412MHz to 2462MHz	
Rating	DC 3.70V	
Hardware version	5096SF_MM1_V01	
Software version	HYUNDAI_L445_V5.0.2_20150907	
Result	PASS	

## **TEST REPORT**

Test Report No. :		MWR150900605	May 22, 2015		
Equipment under Test	:	Mobile Phone			
Model /Type	:	L445			
Listed Models	:	N/A			
Applicant	:	HYUNDAI CORPORAT	ION		
Address	:	140-2, Kye-dong, Chong	gro-ku, Seoul, South Korea		
Manufacturer		Skycom Telecommuni	cations Co., Limited		
Address	:	Rm604, East Block, She Chegongmiao, Futian D	engtang Bldg., No.1, Tairan 9 Rd., istrict, Shenzhen, China		

Test Result PASS
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The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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### 1. <u>TEST STANDARDS</u>

The tests were performed according to following standards:

<u>FCC Rules Part 15.247</u>: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

ANSI C63.10:2009: American National Standard for Testing Unlicensed Wireless Devices

<u>KDB558074 D01 V03:</u> Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

### 2. <u>SUMMARY</u>

### 2.1. General Remarks

Date of receipt of test sample	:	Aug 20, 2015
Testing commenced on	:	Aug 21, 2015
Testing concluded on	:	Sep 22, 2015

### 2.2. Product Description

The **HYUNDAI CORPORATION**'s Model: L445 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	Mobile Phone
Model Number	L445
Modilation Type	GMSK for GSM/GPRS, 8-PSK for EDGE, QPSK for UMTS,
	QPSK, 16QAM for LTE
Antenna Type	Internal
UMTS Operation Frequency Band	Device supported UMTS FDD Band II/IV/V
	IEEE 802.11b:2412-2462MHz
WI AN ECC Operation frequency	IEEE 802.11g:2412-2462MHz
WEAR 100 Operation nequency	IEEE 802.11n HT20:2412-2462MHz
	IEEE 802.11n HT40:2422-2452MHz
BT FCC Operation frequency	2402MHz-2480MHz
HSDPA Release Version	Release 10
HSUPA Release Version	Release 6
DC-HSUPA Release Version	Not Supported
WCDMA Release Version	R99
LTE Release Version	R8
UMTS Operation Frequency Band	Device supported FDD band 2, FDD band 4, FDD band 5,
	FDD band V 7, FDD band V 17
	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
WI AN ECC Modulation Type	IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)
WEAR TOO Modulation Type	IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
	IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)
BT Modulation Type	GFSK (BT 4.0)/GFSK,8DPSK,π/4DQPSK(BT 3.0+EDR)
Hardware version	5096SF_MM1_V01
Software version	HYUNDAI_L445_V5.0.2_20150907
Android version	Android 4.4.2
GPS function	Supported
WLAN	Supported 802.11b/802.11g/802.11n
Bluetooth	Supported BT 4.0/BT 3.0+EDR
GSM/EDGE/GPRS	Supported GSM/GPRS/EDGE
GSM/EDGE/GPRS Power Class	GSM900:Power Class 4/DCS1800:Power Class 1
GSM/EDGE/GPRS Operation Frequency	GSM900 :880MHz-915MHz/DCS1800:1710MHz-1785MHz
GSM/EDGE/GPRS Operation Frequency	GSM900/DCS1800/GPRS900/ GPRS
Band	1800/EDGE900/EDGE1800
GSM Release Version	R99
GPRS/EDGE Multislot Class	GPRS/EDGE: Multi-slot Class 12
Extreme temp. Tolerance	-30°C to +50°C
Extreme vol. Limits	3.40VDC to 4.20VDC (nominal: 3.70VDC)
GPRS operation mode	Class B

### 2.3. Equipment Under Test

### Power supply system utilised

Power supply voltage	:	0	120V / 60 Hz	0	115V / 60Hz
		0	12 V DC	0	24 V DC
			Other (specified in blank bel	ow	)

#### DC 3.70V

### 2.4. Description of the test mode

IEEE 802.11b/g/n: The product support Third channels but only use Eleventh channels in USA.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432		
6	2437		
7	2442		

### 2.5. Short description of the Equipment under Test (EUT)

#### 2.5.1 General Description

L445 is subscriber equipment in the WCDMA/GSM /LTE system. The HSPA/UMTS frequency band is Band II, Band IV and Band V, LTE frequency band is band 2.band 4,band 5,band 7,band 17; The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only Band II and Band V and GSM850 and PCS1900 bands test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSPA/UMTS ,LTE and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and SIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

#### 2.5.2 Test Modes

Tost Case	Test Conditions	
Test Case	Configuration	Description
DTS (6 dB) Bandwidth	Measurement Method	FCC KDB 558074 §8.2 Option 2
	Test Environment	NTNV
		11b_L,11b_M,11b_H
	FUT Configuration	11g_L,11g_M,11g_H
	EOT Configuration	11n HT20_L, 11n HT20_M, 11n HT20_H
		11n HT40_L, 11n HT40_M, 11n HT40_H
	Measurement Method	FCC KDB 558074§9.1.2
Maximum Peak Conducted Output Power	Test Environment	NTNV
	Test Setup	Test Setup 1
		11b_L,11b_M,11b_H
	EUT Configuration	11g_L,11g_M,11g_H
		11n HT20_L, 11n HT20_M, 11n HT20_H
		11n HT40_L, 11n HT40_M, 11n HT40_H
	Measurement Method	FCC KDB 558074 §10.2 (peak PSD).
	Test Environment	NTNV
Maximum Power Spectral Density		11b_L,11b_M,11b_H
Level	EUT Configuration	11g_L,11g_M,11g_H
	EOT Configuration	11n HT20_L, 11n HT20_M, 11n HT20_H
		11n HT40_L, 11n HT40_M, 11n HT40_H
Unwanted Emissions into Non-	Measurement Method	FCC KDB 558074§11.0.

Restricted Frequency Bands	Test Environment	NTNV
	Test Setup	Test Setup 1
		11b_L,11b_M,11b_H
	ELIT Configuration	11g_L,11g_M,11g_H
	Lor coniguration	11n HT20_L, 11n HT20_M, 11n HT20_H
		<u>11n HT40_L, 11n HT40_M, 11n HT40_H</u>
	Measurement Method	FCC KDB 558074§12.2, Conducted
	medoarement method	(antenna-port).
Unwanted Emissions into Restricted	Test Environment	NTNV
Frequency Bands (Conducted)		11b_L,11b_M,11b_H
	FUT Configuration	11g_L,11g_M,11g_H
	Lot coniguration	11n HT20_L, 11n HT20_M, 11n HT20_H
		<u>11n HT40_L, 11n HT40_M, 11n HT40_H</u>
Unwanted Emissions into	Measurement Method	FCC KDB
Restricted		558074§12.1,Radiated(cabinet/case
		emissions with
		Impedance matching for antenna-port).
	Test Environment	NTNV
		11b_L,11b_M,11b_H
	FUT Configuration	11g_L,11g_M,11g_H
		11n HT20_L, 11n HT20_M, 11n HT20_H
		11n HT40_L, 11n HT40_M, 11n HT40_H

Test Case	Test Conditions				
Test Case	Configuration	Description			
AC Power Line Conducted	Measurement Method	AC mains conducted.			
Emissions	Test Environment	NTNV			
	EUT Configuration	11g_M (Worst Conf.).			

Note: 1. For Radiated Emissions, By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "Z axis" position was the worst, then the final test was executed the worst condition and test data were recorded in this report.

2. Typical working modes for each IEEE 802.11mode are selected to perform tests. The manufacturer provide special test software to control TX duty cycle >98% for TX test; recorded worst case at difference data rate as follows:

Test Mode	Test Modes Description
11b	IEEE 802.11b with data rate of 1 Mbps using SISO mode.
11g	IEEE 802.11g with data rate of 6 Mbps using SISO mode.
11n HT20	IEEE 802.11n with data date of MCS0 and bandwidth of 20MHz using SISO mode.
11n HT40	IEEE 802.11n with data date of MCS7 and bandwidth of 40MHz using SISO mode.

### 2.6. EUT operation mode

Test Mode	RF Ch.	TX Freq. [MHz]	RX Freq. [MHz]	Ch. BW [MHz]
	L	Ch No. 1 / 2412MHz		20
11b	М	Ch No. 6 / 2437 MHz		20
	Н	Ch No. 11/ 2462MHz		20
	L	Ch No. 1 / 2412MHz		20
11g	М	Ch No. 6 / 2437 MHz		20
	Н	Ch No. 11/ 2462MHz		20
	L	Ch No. 1 / 2412MHz		20
11n HT20	М	Ch No. 6 / 2437 MHz		20
	Н	Ch No. 11/ 2462MHz		20
	L	Ch No. 3/ 2422MHz		40
11n HT40	М	Ch No. 6 / 2437 MHz		40
	Н	Ch No. 9/ 2452 MHz		40

### 2.7. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
- $\ensuremath{\bigcirc}$  supplied by the lab

0	Power Cable	Length (m) :	/
		Shield :	1
		Detachable :	1
0	Multimeter	Manufacturer :	1
		Model No. :	1

### 2.8. Internal Identification of AE used during the test

AE ID*	Description
AE1	Charger

AE1 Model: S005UA0500100 INPUT: 100-240V 50/60Hz 0.15A OUTPUT: DC 5.0V,1000mAh \*AE ID: is used to identify the test sample in the lab internally.

### 2.9. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: RQQHLT-L40SCL filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

### 2.10. Modifications

No modifications were implemented to meet testing criteria.

### 2.11. Test Environments

NOTE: The values used in the test report maybe stringent than the declared.

Environment Parameter	Selected Values During Tests				
	Temperature	Voltage	Relative Humidity		
	Ambient	3.7VDC	Ambient		

1. The frequency bands used in this EUT are listed as follows:

Frequency Band(MHz)	2400-2483.5	5150-5350	5470-5725	5725-5850
802.11b	$\checkmark$	—	—	—
802.11g	$\checkmark$	—	—	—
802.11n HT20	$\checkmark$	—	—	—
802.11n HT40	$\checkmark$	—	—	—

# 2. The EUT incorporates a SISO function, Physically, the EUT provides one completed transmitter and one completed receiver.

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX
802.11n HT20	1TX
802.11n HT40	1TX

### 3. TEST ENVIRONMENT

#### 3.1. Address of the test laboratory

#### CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China The sites are constructed in conformance with the requirements of ANSI C63.4 (2003) and CISPR Publication 22.

### 3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

### FCC-Registration information:

#### FCC-Registration No.: 406086

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter fr om the FCC is maintained in our files. Registration 406086, valid time is until October 28, 2017.

#### 3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

### 3.4. Test Description

Test Item	FCC Part No.	Requirements	Verdict
DTS (6 dB) Bandwidth	15.247(a)(2)	≥ 500 kHz.	PASS
Maximum Peak Conducted Output Power	15.247(b)(3)	For directional gain:< 30dBm – (G[dBi] –6 [dB]),peak; Otherwise :< 30dBm, peak.	PASS
Maximum Power Spectral Density Level	15.247(e)	For directional gain :< 8dBm/3 kHz – (G[dBi] –6[dB]), peak. Otherwise :< 8dBm/3 kHz, peak.	PASS
Band Edges Compliance	15.247(d)	< -20dBr/100 kHz if total peak power ≤power limit.	PASS
Unwanted Emissions into Non- Restricted Frequency Bands	15.247(d)	< -20dBr/100 kHz if total peak power ≤power limit.	PASS
Unwanted Emissions into Restricted Frequency Bands (Conducted)	15.247(d) 15.209	< -20dBr/100 kHz if total peak power ≤power limit.	PASS
Unwanted Emissions into Restricted Frequency Bands (Radiated)	15.247(d) 15.209	FCC Part 15.209 field strength limit;	PASS
AC Power Line Conducted Emissions	15.207	FCC Part 15.207 conducted limit;	PASS

Remark: The measurement uncertainty is not included in the test result.

### 3.5. Summary of measurement results

Test Specification clause	Test case	Test Mode	Test Channel	Record In Rep	led ort	Pass	Fail	NA	NP	Remark
§15.247(b)(4)	Antenna gain	802.11b	⊠ Lowest ⊠ Middle ⊠ Highest	802.11b	⊠ Lowest ⊠ Middle ⊠ Highest					complies
§15.247(e)	Power spectral density	802.11b 802.11g 802.11n HT20 802.11n HT40	⊠ Lowest ⊠ Middle ⊠ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	⊠ Lowest ⊠ Middle ⊠ Highest					complies
§15.247(a)(1)	Spectrum bandwidth – 6 dB bandwidth	802.11b 802.11g 802.11n HT20 802.11n HT40	⊠ Lowest ⊠ Middle ⊠ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	⊠ Lowest ⊠ Middle ⊠ Highest	$\boxtimes$				complies
§15.247(b)(1)	Maximum output power	802.11b 802.11g 802.11n HT20 802.11n HT40	⊠ Lowest ⊠ Middle ⊠ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	⊠ Lowest ⊠ Middle ⊠ Highest	XXX				complies
§15.247(d)	Band edge compliance conducted	802.11b 802.11g 802.11n HT20 802.11n HT40	⊠ Lowest ⊠ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	⊠ Lowest ⊠ Highest					complies
§15.205	Band edge compliance radiated	802.11b 802.11g 802.11n HT20 802.11n HT40	⊠ Lowest ⊠ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	⊠ Lowest ⊠ Highest					complies
§15.247(d)	TX spurious emissions conducted	802.11b 802.11g 802.11n HT20 802.11n HT40	⊠ Lowest ⊠ Middle ⊠ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	⊠ Lowest ⊠ Middle ⊠ Highest					complies
§15.247(d)	TX spurious emissions radiated	802.11b 802.11g 802.11n HT20 802.11n HT40	⊠ Lowest ⊠ Middle ⊠ Highest	802.11b	⊠ Lowest ⊠ Middle ⊠ Highest					complies
§15.109	RX spurious emissions radiated	-/-	-/-	-/-	-/-					complies
§15.209(a)	TX spurious Emissions radiated < 30 MHz	802.11b	-/-	802.11b	-/-					complies
§15.107(a) §15.207	Conducted Emissions < 30 MHz	802.11b	-/-	802.11b	-/-					complies

#### Remark:

- The measurement uncertainty is not included in the test result.
   NA = Not Applicable; NP = Not Performed

#### Description Manufacturer Model Serial No. Test Date Due Date **EMI Test Receiver** R&S ESIB26 A0304218 2015.06.02 2016.06.01 12.8m\*6.8m\*6 **Full-Anechoic Chamber** A0412372 2015.01.05 2016.01.04 Albatross .4m Schwarz Loop Antenna HFH2-Z2 100047 2015.06.02 2016.06.01 beck Schwarzbec **Bilog Antenna VULB 9163** 9163-274 2015.06.02 2016.06.01 k Schwarzbec **VULB 9163** 9163-276 2015.06.02 2016.06.01 **Bilog Antenna** k Double ridge horn R&S HF960 100150 2015.06.02 2016.06.01 antenna Double ridge horn R&S HF960 100155 2015.06.02 2016.06.01 antenna Ultra-wideband antenna R&S HL562 100089 2015.06.02 2016.06.01 100090 2015.06.02 Ultra-wideband antenna R&S HL562 2016.06.01 Test Antenna – Horn ETS UG-596A/U A0902607 2015.06.02 2016.06.01 (18-25GHz) Test Antenna – Horn ETS UG-596A/U A0902611 2015.06.02 2016.06.01 (18-25GHz) Amplifier 20M~3GHz R&S PAP-0203H 22018 2015.06.02 2016.06.01 MITEQ Ampilier 1G~18GHz R&S AFS42-25-S-42 2015.06.02 2016.06.01 00101800 JS42-12111.0980.0 Ampilier 18G~40GHz R&S 18002600-28-2015.06.02 2016.06.01 0 5A System Simulator R&S CMW500 A130101034 2015.06.010 2016.06.09 Agilent Signal Analyzer N9030A MY49430428 2015.06.010 2016.06.09 823.3618.03 Power Sensor NRP-Z4 2015.06.02 R&S 2016.06.01 Power Meter R&S NRVS 1020.1809.02 2015.06.02 2016.06.01 LISN R&S ESRV26 A0304221 2015.06.02 2016.06.01 EMI Test Receiver R&S ESCS A0304260 2015.06.02 2016.06.01

#### 3.6. Equipments Used during the Test

The Cal.Interval was one year

### 4. TEST CONDITIONS AND RESULTS

### 4.1. AC Power Conducted Emission

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

- 1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013;
- 2. Support equipment, if needed, was placed as per ANSI C63.10-2013;
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013;
- The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5. All support equipments received AC power from a second LISN, if any.
- 6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.

#### AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following:

Eroquanav	Maximum RF Line Voltage (dBµV)						
(MHz)	CLA	SS A	CLASS B				
	Q.P.	Ave.	Q.P.	Ave.			
0.15 - 0.50	79	66	66-56*	56-46*			
0.50 - 5.00	73	60	56	46			
5.00 - 30.0	73	60	60	50			

\* Decreasing linearly with the logarithm of the frequency

#### TEST RESULTS

The AC Power Conducted Emission measurement is performed the each test mode (b/g/n) and channel (low/mid/high), the datum recorded below (802.11b mode, the middle channel) is the worst case for all the test modes and channels.





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### 4.2. Radiated Emission

#### **TEST CONFIGURATION**

Frequency range 9 KHz – 30MHz



#### Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

- 1. 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT.
- 3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 4. Repeat above procedures until all frequency measurements have been completed.
- The EUT minimum operation frequency was 32.768 KHz and maximum operation frequency was 2480MHz.so radiated emission test frequency band from 9 KHz to 25GHz.

6.	5. The distance between test antenna and EUT as following table states:					
	Test Frequency range	Test Antenna Type	Test Distance			
	9KHz-30MHz	Active Loop Antenna	3			
	30MHz-1GHz	Ultra-Broadband Antenna	3			
	1GHz-18GHz	Double Ridged Horn Antenna	3			
	18GHz-25GHz	Horn Anternna	1			

7. Setting test receiver/spectrum as following table states:

Setting test receiver spectrum as following table states.					
Test Frequency range	Test Receiver/Spectrum Setting	Detector			
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP			
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP			
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP			
	Peak Value: RBW=1MHz/VBW=3MHz,	Peak			
	Sweep time=Auto	(Receiver)			
IGHZ-40GHZ	Average Value: RBW=1MHz/VBW=3MHz,	Average			
	Sweep time=Auto	(Receiver)			

#### Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

#### FS = RA + AF + CL - AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

#### **RADIATION LIMIT**

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

Frequency (MHz)	Distance (Meters)	Radiated (dBµV/m)	Radiated (µV/m)
0.009-0.49	300	20log(2400/F(KHz))+80	2400/F(KHz)
0.49-1.705	30	20log(24000/F(KHz))+40	24000/F(KHz)
1.705-30	30	20log(30)+40	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

#### TEST RESULTS

Remark:

1. The radiated measurement are performed the each test mode (b/g/n) and channel (low/mid/high), the datum recorded below (802.11b mode, the middle channel) is the worst case for all the test mode and channel.

2. ULTRA-BROADBAND ANTENNA for the radiation emission test below 1G.

3. HORN ANTENNA for the radiation emission test above 1G.

4. We tested both battery powered and powered by adapter charging mode at three orientate ons, recorded worst case at powered by adapter charging mode.

5. "---" means not recorded as emission levels lower than limit.

6. Margin= Limit - Level

#### For 9KHz to 30MHz

Frequency (MHz)	Corrected Reading (dBµV/m)@3m	FCC Limit (dBµV/m) @3m	Margin (dB)	Detector	Result
12.00	43.31	69.54	26.23	QP	PASS
24.00	46.08	69.54	23.46	QP	PASS

Horizontal

### For 30MHz to 1000MHz

Polarization



### Polarization

Vertical



#### For 1GHz to 25GHz

Note: We tested 11b, 11g, 11n HT20, 11n HT40 and rcorded the worst case at the 11b Mode.



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#### REMARKS:

- 1. Emission level (dBuV/m) =Raw Value (dBuV) + Correction Factor (dB/m)
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Limit value- Emission level.
- 5. For Wireless 802.11b mode at 1Mbps.

#### 4.3. Maximum Peak Output Power

#### TEST CONFIGURATION



#### TEST PROCEDURE

According to KDB558074 D01 DTS Meas Guidance v03:

PKPM1 Peak power meter method: The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

Maximum conducted (average) output power: As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.

1. The EUT is configured to transmit continuously, or to transmit with a constant duty factor.

2. At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.

3. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

If the transmitter does not transmit continuously, measure the duty cycle (x) of the transmitter output signal as described in Section 6.0.

Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

Adjust the measurement in dBm by adding  $10\log(1/x)$ , where x is the duty cycle to the measurement result.

#### <u>LIMIT</u>

The Maximum Peak Output Power Measurement is 30dBm.

#### TEST RESULTS

Remark: We measured output power at difference data rate for each mode and recorded worst case for each mode.

#### 4.3.1 802.11b Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
1	2412	13.44	30	PASS
6	2437	13.52	30	PASS
11	2462	13.59	30	PASS

Note:

1. For 802.11b mode at finial test to get the worst-case emission at 1Mbps.

2. The test results including the cable lose.

#### 4.3.2 802.11g Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
1	2412	13.76	30	PASS
6	2437	13.71	30	PASS
11	2462	13.54	30	PASS

Note:

1. For 802.11g mode at finial test to get the worst-case emission at 6Mbps.

2. The test results including the cable lose.

#### 4.3.3 802.11n HT20 Test Mode

#### A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
1	2412	13.57	30	PASS
6	2437	13.60	30	PASS
11	2462	13.69	30	PASS

Note:

1. For 802.11n HT20 mode at finial test to get the worst-case emission at 6.5Mbps.

2. The test results including the cable lose.

#### 4.3.4 802.11n HT40 Test Mode

#### A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
3	2422	13.87	30	PASS
6	2437	13.73	30	PASS
9	2452	13.88	30	PASS

Note:

1. For 802.11n HT40 mode at finial test to get the worst-case emission at 13.5Mbps.

2. The test results including the cable lose.

### 4.4. Power Spectral Density

#### TEST CONFIGURATION



#### TEST PROCEDURE

According to KDB 558074 D01 V03 Method PKPSD (peak PSD) this procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. Set the span to 1.5 times the DTS bandwidth.
- 3. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- 4. Set the VBW  $\geq$  3 RBW.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level within the RBW.
- 10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### <u>LIMIT</u>

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

#### **TEST RESULTS**

#### 4.4.1 802.11b Test Mode

Α.	Test	Verdict	
			_

Channel	Frequency (MHz)	Report PSD (dBm/100KHz)	Refer to Plot	Limits (dBm/3KHz)	Verdict
1	2412	-0.731	Plot 4.4.1 A	8	PASS
6	2437	-0.854	Plot 4.4.1 B	8	PASS
11	2462	-1.163	Plot 4.4.1 C	8	PASS

Note:

1. For 802.11b mode at finial test to get the worst-case emission at 1Mbps.

2. The test results including the cable lose.

#### B. Test Plots







(Plot 4.4.1 B: Channel 6: 2437MHz @ 802.11b)



(Plot 4.4.1 C: Channel 11: 2462MHz @ 802.11b)

#### 4.4.2 802.11g Test Mode

#### A. Test Verdict

Channel	Frequency (MHz)	Report PSD (dBm/100KHz)	Refer to Plot	Limits (dBm/3KHz)	Verdict
1	2412	-10.876	Plot 4.4.2 A	8	PASS
6	2437	-10.477	Plot 4.4.2 B	8	PASS
11	2462	-10.256	Plot 4.4.2 C	8	PASS

Note:

1. For 802.11g mode at finial test to get the worst-case emission at 6Mbps.

2. The test results including the cable lose.

B. Test Plots







(Plot 4.4.2 B: Channel 6: 2437MHz @ 802.11g)



(Plot 4.4.2 C: Channel 11: 2462MHz @ 802.11g)

#### 4.4.3 802.11n HT20 Test Mode

#### A. Test Verdict

Channel	Frequency (MHz)	Report PSD (dBm/100KHz)	Refer to Plot	Limits (dBm/3KHz)	Verdict
1	2412	-9.876	Plot 4.4.3 A	8	PASS
6	2437	-9.816	Plot 4.4.3 B	8	PASS
11	2462	-10.560	Plot 4.4.3 C	8	PASS

Note:

1. For 802.11n HT20 mode at finial test to get the worst-case emission at 6.5Mbps.

2. The test results including the cable lose.

B. Test Plot







(Plot 4.4.3 B: Channel 6: 2437MHz @ 802.11n HT20)



(Plot 4.4.3 C: Channel 11: 2462MHz @ 802.11n HT20)

#### 4.4.4 802.11n HT40 Test Mode

#### A. Test Verdict

Channel	Frequency (MHz)	Report PSD (dBm/100kHz)	Refer to Plot	Limits (dBm/3KHz)	Verdict
3	2422	-13.592	Plot 4.4.4 A	8	PASS
6	2437	-13.778	Plot 4.4.4 B	8	PASS
9	2452	-13.436	Plot 4.4.4 C	8	PASS

Note:

1. For 802.11n HT40 mode at finial test to get the worst-case emission at 13.5Mbps.

2. The test results including the cable lose.

B. Test Plots



(Plot 4.4.4 A: Channel 3: 2422MHz @ 802.11n HT40))



(Plot 4.4.4 B: Channel 6: 2437MHz @ 802.11n HT40)



(Plot 4.4.4 C: Channel 6: 2452MHz @ 802.11n HT40)

### 4.5. Band Edge Compliance of RF Emission

#### TEST REQUIREMENT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

#### TEST PROCEDURE

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
- 3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz.
- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- 5. Repeat above procedures until all measured frequencies were complete.

#### **TEST CONFIGURATION**

For Radiated



#### For Conducted



#### TEST PROCEDURE

- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT.

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- 3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 4. Repeat above procedures until all frequency measurements have been completed..
- 5. The distance between test antenna and EUT was 3 meter:
- 6. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
	Peak Value: RBW=1MHz/VBW=3MHz,	Peak
IGHZ-40GHZ	Sweep time=Auto	(Receiver)
	Average Value: RBW=1MHz/VBW=3MHz,	Average
IGHZ-40GHZ	Sweep time=Auto	(Receiver)

#### <u>LIMIT</u>

Below -20dB of the highest emission level in operating band. Radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)

#### TEST RESULTS

#### 4.5.1 For Radiated Bandedge Measurement

Remark:

1. The Bandedge was measured at difference data rate for each mode and recorded worst case for 11b.



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Alter All

2480

Frequency in MHz

للحر باللبا استأطل

2490

L.

2500

2510

50

40+

2457

2470

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#### 4.5.2 For Conducted Bandedge Measurement

#### 802.11b

A. Test Plots

gilent Spectrum Analyzer - Swept SA Agianety of RL RF 50 Ω AC Center Freq 2.400000000 GHz PN0: Fast IFGain:Low 11 PM Sep 12, 2015 TRACE 1 2 3 4 5 TYPE M WWWWW DET P P P P P P #Avg Type: RMS Avg|Hold: 100/100 Frequency Tria: Free Run #Atten: 40 dB Auto Tune Mkr4 2.362 612 5 GHz -50.293 dBm Ref Offset 0.9 dB Ref 30.00 dBm 10 dB/div Log **Center Freq**  $\Diamond^1$ 2.40000000 GHz -16.43 d Start Freq 2.350000000 GHz 2 4 3 Stop Freq 2.45000000 GHz Center 2.40000 GHz #Res BW 100 kHz Span 100.0 MHz Sweep 9.60 ms (8001 pts) CF Step 10.000000 MHz #VBW 300 kHz Man Auto FUNCTION WIDTH 23 3m NN **Freq Offset** 5 GHz 50.293 dBm 56 0 Hz ε 10 11 12 STATUS





(Plot 4.5.2.1 B: Channel 11: 2462MHz @ 802.11 b )

#### 802.11g

#### A. Test Plots

Agilent Spectrum Analyzer - Swept SA					
Center Fred 2 400000000	GH7 SEN	SE:INT #Avg Typ	ALIGNAUTO 04:53:0 e: RMS TF	DPM Sep 12, 2015 ACE 1 2 3 4 5 6	Frequency
Ref Offset 0.9 dB	PNO: Fast +++ Trig: Free IFGain:Low #Atten: 40	Run Avg Hold dB	Mkr4 2.367 4		Auto Tune
10 dB/div Ref 30.00 dBm			-48.	687 dBm	
		\$ <sup>1</sup>			Center Freq 2.400000000 GHz
-10.0		plad and an a statistic for an	<u> </u>		
-20.0		/	<u></u>	-19.40 dBm	Start Freq
-30.0		2			2.350000000 GHz
-40.0 4 -50.0 +++++++++++++++++++++++++++++++++++	alator and the providence of the state of th		All the state of t	harartekteris atrasisatus kaise	<b>Stop Freq</b> 2.45000000 GHz
Center 2.40000 GHz #Res BW 100 kHz	#VBW 300 kHz		Span Sweep 9.60 ms	100.0 MHz (8001 pts)	CF Step 10.000000 MHz
MKR MODE TRC SCL X		FUNCTION FU	NCTION WIDTH FUNC	TION VALUE	<u>Auto</u> Man
2 N 1 f 2.400 C	000 0 GHz -42.288 dB	m			
3 N 1 f 2.390 0 4 N 1 f 2.367 4 5 6	000 0 GHz -50.038 dB 450 0 GHz -48.687 dB	m m			Freq Offset 0 Hz
7 8					
9					
11					
MSG			STATUS		





(Plot 4.5.2.2 B: Channel 11: 2462MHz @ 802.11 g)

#### 802.11n HT20

#### A. Test Plots

Agile	nt Spe	ctru	n An	alyzer - Sv	vept SA		-											
Cer	ter	Fre	RF Q	ء <sup>50</sup> 2.4000	2 AC	GHz	z		SEN	VSE:IN	<u>  TI</u>	#Avg	Тур	ALIGNAUTO e: RMS	04:59:321 TRA	PM Sep 12, 2015 CE 1 2 3 4 5 6		Frequency
			Ref	Offset 0	9 dB	PNC IFGa	): Fast in:Low	#A	ig: Free tten: 40	dB	1	Avg F	Hold:	100/100 Mkr4 2	. <b>382 1</b> 6	25GHz		Auto Tune
10 d Loa	B/di	<i>i</i>	Ref	30.00	dBm										-48.5	14 dBm		
20.0 10.0												1						Center Freq 2.400000000 GHz
-10.0											فاعلمك	e Julei	المرار	<u>.</u>				
-20.0 -30.0										4						-25.62 dBm		Start Freq 2.350000000 GHz
-40.0 -50.0 -60.0	ary a la		n di kan	Margal Lation 14	<b>selvel</b> essep	it in the	◆ <sup>4</sup> —	1) <b>1</b> 2	Nacio da la com	2				hulopathath	alaul ar an Iach Ia			<b>Stop Freq</b> 2.450000000 GHz
Cer #Re	nter es Bi	2.40 W 1	000 00	0 GHz kHz			#VI	3W 30	) kHz					Sweep	Span ′ 9.60 ms	100.0 MHz (8001 pts)		CF Step 10.000000 MHz
MKR	MODE	TRC	SCL		×	200.0			Y 640 JE		FUN	CTION	FUI	NCTION WIDTH	FUNCT	ON VALUE	<u>A</u>	<u>uto</u> Man
1 2 3 4 5	ZZZZ	1 1 1	f f f		2.413 2.400 2.390 2.382	300 0 000 0 000 0 162 5	GHZ GHZ GHZ GHZ	-52 -53 -48	.618 dE .723 dE .970 dE .514 dE	3m 3m 3m 3m								Freq Offset 0 Hz
6 7 8 9																		
10 11 12														OTATUS				
Wad		_	_		_					_		_	_	STATUS	1			





(Plot 4.5.2.3 B: Channel 11: 2412MHz @ 802.11n HT20)

#### 802.11n HT40

#### A. Test Plots

Agilent Spectr	um Analyzer - S	Swept SA								
Center F	rea 2.400	000000 GHz		SEN	ISE:INT	#Avg	ALIGN AUTO	05:03:54 Pf TRAC	4 Sep 12, 2015 E 1 2 3 4 5 6	Frequency
10 dB/div	Ref Offset	PNO IFGa 0.9 dB 0 dBm	): Fast ↔ in:Low	#Atten: 40	Run dB	Avg H	old: 100/100 Mkr4 2.	388 237 -49.72	5 GHz 4 dBm	Auto Tune
20.0 10.0 0.00							1			Center Freq 2.400000000 GHz
-10.0 -20.0 -30.0					, hile 	البايرانيوني المراديني المراديني المراديني المراديني المراديني المراديني المراديني المراديني المراديني المرادين	dahalan pendukatataj	al on in an fail of a	-28.35 dBm	Start Freq 2.350000000 GHz
-40.0 -50.0 -60.0	Martin d. R. J. Jacob Barran Barr	an si digong sa poperti da biri j	and and a state of the state of	3	<i>‡</i>					<b>Stop Freq</b> 2.45000000 GHz
Center 2.4 #Res BW	10000 GHz 100 kHz		#VBW	300 kHz			Sweep	Span 1 9.60 ms (	00.0 MHz 8001 pts)	CF Step
MKR MODE TF	RC  SCL  f	× 2.419 512 5	GHz	Y -8.351 dE	F Sm	UNCTION	FUNCTION WIDTH	FUNCTIO	N VALUE	<u>Auto</u> Man
2 N 1 3 N 1 4 N 1 5 6	f f f	2.400 000 0 2.390 000 0 2.388 237 5	GHz GHz GHz	-53.334 dE -53.653 dE -49.724 dE	Sm Sm Sm					<b>Freq Offset</b> 0 Hz
7 8 9 10 11										
12 MSG							STATUS			





(Plot 4.5.2.4 B: Channel 9: 2452MHz @ 802.11n HT40)

#### 4.6. Spurious RF Conducted Emission

#### TEST CONFIGURATION



#### TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2009 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100 kHz and VBW= 300 KHz to measure the peak field strength, and measure frequency range from 9 KHz to 26.5GHz.

#### <u>LIMIT</u>

1. Below -20dB of the highest emission level in operating band.

2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

#### TEST RESULTS

Remark: The measurement frequency range is from 9 KHz to the 10<sup>th</sup> harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

#### 4.6.1 802.11b Test Mode

Channel	Frequency (MHz)	Frequency Range	Refer to Plot	Limit (dBc)	Verdict
		2.412 GHz	Plot 4.6.1 A1		PASS
		30MHz -3GHz	Plot 4.6.1 A2	-20	PASS
1	2412	3GHz5 GHz	Plot 4.6.1 A3	-20	PASS
1		3GHz10 GHz	Plot 4.6.1 A4		
		10GHz15 GHz	Plot 4.6.1 A5		
		15GHz25 GHz	Plot 4.6.1 A6		
		2.437 GHz	Plot 4.6.1 B1		PASS
		30MHz -26GHz	Plot 4.6.1 B2	-20	PASS
6	2427	3GHz-26.5 GHz	Plot 4.6.1 B3	-20	PASS
0	2437	3GHz10 GHz	Plot 4.6.1 B4		
		10GHz15 GHz	Plot 4.6.1 B5		
		15GHz25 GHz	Plot 4.6.1 B6		
		2.462 GHz	Plot 4.6.1 C1		PASS
		30MHz -26GHz	Plot 4.6.1 C2	-20	PASS
11	2462	3GHz-26.5 GHz	Plot 4.6.1 C3	-20	PASS
	2402	3GHz10 GHz	Plot 4.6.1 C4		
		10GHz15 GHz	Plot 4.6.1 C5		
		15GHz25 GHz	Plot 4.6.1 C6		

#### A. Test Verdict

Note:

1. For 802.11b mode at finial test to get the worst-case emission at 1Mbps.

2. The test results including the cable lose.

3. For 9KHz -30MHz,Because there was only background, So We did not recorded data.



(Plot 4.6.1 A1: Channel 1: 2412MHz @ 802.11b)

Agilent S	pectrum Analyzer - Swept SA							
Cente	RF 50 Ω AC	GHz	SENSE:INT	#Avg Type	ALIGN AUTO	04:47:24 Pl TRAC	M Sep 12, 2015	Frequency
		PNO: Fast ↔ Trig: Fr IFGain:Low #Atten:	ee Run 30 dB	Avg Hold:	12/100	TYF De	E MWWWWW T P P P P P P	
10 dB/d	Ref Offset 0.9 dB div Ref 20.90 dBm				Mk	r1 2.994 -58.4	4 GHz 24 dBm	Auto Tune
10.9					2			Center Freq 1.515000000 GHz
0.900 — -9.10 —								Start Freq 30.000000 MHz
-19.1							-16.50 dBm	<b>Stop Freq</b> 3.000000000 GHz
-39.1								<b>CF Step</b> 297.000000 MHz <u>Auto</u> Man
-59.1 —		ta da serie da filo da la successione serie da se filo da serie da serie da serie da serie da serie da serie d Serie da serie da ser	ister af state of the state of th			ha dina mana ang sa		<b>Freq Offset</b> 0 Hz
-69.1	30 MHz					Stop 3	000 CH2	
#Res E	BW 100 kHz	#VBW 300 kH	z		Sweep	284 ms (	8001 pts)	
MSG					STATUS			

(Plot 4.6.1 A2: Channel 1: 2412MHz @ 802.11b)

Agiler	nt Spectru	m Analyzer - Sv	vept SA								
Cer	L nter Fr	RF 50 s eq 4.0000	2 AC 00000 G	Hz	SEI	NSE:INT	#Avg Typ	ALIGNAUTO e: RMS	04:47:28F TRAC	M Sep 12, 2015	Frequency
10 di	B/div	Ref Offset 0 Ref 20.90	.9 dB dBm	PNO: Fast ↔ Gain:Low	#Atten: 30	) dB	Avginoid	Mkr	1 4.824 -51.7	00 GHz 18 dBm	Auto Tune
10.9											Center Freq 4.000000000 GHz
0.900 -9.10						-				-16.50 dBm	Start Freq 3.000000000 GHz
-19.1 -29.1											<b>Stop Freq</b> 5.000000000 GHz
-39.1 -49.1										<b>♦</b> <sup>1</sup>	CF Step 200.000000 MHz <u>Auto</u> Man
-59.1	idal Nyatika Nyatika	han a laithe fireid. Taragan an taine a	dille a ballan a d	, dilli dalarini da d <sup>alarina</sup> (terretari n			shiles afshired Agamentes	lan biblio och dadi Provi provi och piper d		al de part a la militade. Nel servere en estadore	Freq Offset 0 Hz
Star #Re	t 3.00 s BW	) GHz 100 kHz		#VBW	300 kHz			Sweep	Stop 5 191 ms (	.000 GHz 8001 pts)	
MSG								STATUS	5		

(Plot 4.6.1 A3: Channel 1: 2412MHz @ 802.11b)

Agiler	nt Spectru	m Analyzer - Sw	rept SA			a courte na com					
Cen	ter Fr	eq 7.5000	00000 GI	Ηz	SE	NSE:INT	#Avg Typ	alignauto	04:47:36 P TRAC	M Sep 12, 2015 E <b>1 2 3 4 5 6</b>	Frequency
			P IF	NO: Fast 🔸	#Atten: 3	e Run 0 dB	AVg Hold:	10/100	D	PPPPP	
10 di	B/div	Ref Offset 0. <b>Ref 20.90</b>	9 dB dBm					Mkr1	7.232 5	00 GHz 72 dBm	Auto Tune
10.9			5	- U							Center Freq 7.500000000 GHz
0.900 -9.10											Start Freq 5.00000000 GHz
-19.1 -29.1			5							-16.50 dBm	<b>Stop Freq</b> 10.000000000 GHz
-39.1											<b>CF Step</b> 500.000000 MHz <u>Auto</u> Man
-59.1	<mark>(h</mark> arandara) Planarianari		ti de la constancia de la		1 Alteria dattis	<mark>li presi di Kali but</mark> Mana di Kali but	al a first a salar lartage	lott is an an abit		e andra ( al (al ability ) ( particul al (al ability)	<b>Freq Offset</b> 0 Hz
-69.1											
Star #Re	t 5.000 s BW 1	GHz 00 kHz		#VBW	300 kHz			Sweep	Stop 10 478 ms (	.000 GHz 8001 pts)	
MSG								STATUS			

(Plot 4.6.1 A:4 Channel 1: 2412MHz @ 802.11b)



(Plot 4.6.1 A5: Channel 1: 2412MHz @ 802.11b)

Agilent Spectr	um Analyzer - Swept S	٨	22					
	reg 20.000000	000 GHz	SENSE:IN	T #Avg Typ	ALIGNAUTO	04:47:51 Pf TRAC	M Sep 12, 2015	Frequency
		PNO: Fast ↔ IFGain:Low	Trig: Free Run #Atten: 32 dB	Avg Hold	: 5/100	TYF DE		
10 dB/div	Ref Offset 0.9 dB Ref 22.90 dBn	n			Mkr1	23.998 -44.8	75 GHz 95 dBm	Auto Tune
12.9								Center Freq 20.000000000 GHz
2.90								<b>Start Freq</b> 15.000000000 GHz
-17.1							-16.50 dBm	<b>Stop Freq</b> 25.000000000 GHz
-37.1		al dine al cui de constatuta area		s and stale disasterio di s			1 Malterinth	<b>CF Step</b> 1.000000000 GHz <u>Auto</u> Man
-67.1					a naparti parabakan			<b>Freq Offset</b> 0 Hz
-67.1								
Start 15.0 #Res BW	00 GHz 100 kHz	#VBW	300 kHz		Sweep	Stop 25. 956 ms (	.000 GHz 8001 pt <u>s)</u>	
MSG					STATUS	3		

(Plot 4.6.1 A6: Channel 1: 2412MHz @ 802.11b)







(Plot 4.6.1 B2: Channel 6: 2437MHz @ 802.11b)

Agilen	it Spectru	ım Analyzer - Sw	rept SA								
COD	tor Er	RF 50 Ω		u	SEI	NSE:INT	#Ava Tvp	ALIGNAUTO	04:48:47 F	M Sep 12, 2015	Frequency
Gen		eq 4.0000	JUUUU G	NO: Fast	. Trig: Free	Run	Avg Hold:	12/100	TY		
	-		H	Gain:Low	#Atten: 30			Miles	4 4 974	00.04-	Auto Tune
10 45	26460	Ref Offset 0.	9 dB					IVINI	-48.9	33 dBm	
Log		Rel 20.90	ивш								
											Center Freq
10.9										5	4.00000000 GHz
0.000											
0.900											Start Freq
-9.10											3.00000000 GHz
										-16.97 dBm	
-19.1											Stop Erog
											5 00000000 GHz
-29.1											
20.4											CE Sten
-39.1										.1	200.000000 MHz
-49.1										<b>♦</b> '	<u>Auto</u> Man
											-
-59.1	. المحملة	initian Local data to ta	<ul> <li>A second of a selation</li> </ul>		Let II with the state of the	a data a data data data data data data	اله الأو حل الأول بعالة إن روي	uthat latan	لير منظور بالأنجل قاس	all at the bala bala	Freq Offset
	With the part of				Musica aldered	white the build with the state	a manina hand	A CONTRACTOR	in a di para dala andra	The states and the	0 Hz
-69.1											
Star	t 3.00	) GHz							Stop 5	.000 GHz	
#Re	s BW	100 kHz		#VBW	300 kHz			Sweep	191 ms	8001 pts)	
MSG								STATUS	5		

(Plot 4.6.1 B3: Channel 6: 2437MHz @ 802.11b)



(Plot 4.6.1 B4: Channel 6: 2437MHz @ 802.11b)

Agilen	it Spectru	ım Analyze	er - Swe	pt SA								
LXI R	tor Er	RF	50 Ω	AC	CH2	SEI	NSE:INT	#Ανα Τικρι	ALIGNAUTO	04:49:01 P	M Sep 12, 2015	Frequency
Cen		eq 12.	5000	00000	PNO: Fast ++ IFGain:Low	Trig: Free #Atten: 30	e Run ) dB	Avg Hold:	9/100	TYI Di		Auto Tuno
10 di	3/div	Ref Offs Ref 20	set 0.9 <b>).90 d</b>	dB I <b>Bm</b>					Mkr1 1	4.653 1 -53.2	25 GHz 20 dBm	Auto Tune
10.9												Center Freq 12.500000000 GHz
0.900 -9.10												<b>Start Freq</b> 10.000000000 GHz
-19.1 -29.1											-16.97 dBm	<b>Stop Freq</b> 15.00000000 GHz
-39.1 -49.1											1	CF Step 500.000000 MHz <u>Auto</u> Man
-59.1			il Jone Theory	allen Hennede Negelaanse		n fan Yngelskinst fan de Generale yn yn yn yn ar	aldateland blaats Altonoorgaalaa		hle har she da ta ha ha ha Ing ang ang ang ang ang ang ang ang ang a	i su litila lan di Ing su litila lan di		Freq Offset 0 Hz
-69.1 Star #Re:	t 10.01 s BW	00 GHz 100 kHz	z		#VBM	/ 300 kHz			Sweep	Stop 15 478 ms (	.000 GHz 8001 pts)	
MSG			_						STATUS			



Agilent Spect	rum Analyzer - Swept SA								
LXI RL	RF 50 Ω AC		SENS	SE:INT	1	ALIGN AUTO	04:49:09 P	M Sep 12, 2015	Frequency
Center F	req 20.0000000	00 GHz	Tria: Free	#/ Dun A	Avg Type	: RMS 5/100	TRAC		rioqueriey
		PNO: Fast	#Atten: 32	dB	a gli ioia. v	07100	DE	ТРРРРР	
		II GUIILEOW				Miland	04 207	SO CH-	Auto Tune
	Ref Offset 0.9 dB					IVIKET	24.321	SU GHZ	
10 dB/div	Ref 22.90 dBm						-40.0	оэ авт	
									Center Freq
12.9									20.00000000 GHz
2.90									
									Start Fred
7.10									15 00000000 GHz
-7,10									10.0000000000000
								10.07.17	
-17.1								-16.97 dBm	Stop From
									StopFreq
-27.1	9							-	25.000000000 GHz
									CE Stop
-37.1								.1	1 00000000 GHz
								• • I	Auto Man
-47.1								Nine Alexi Mann	
and they	المطالبان المراجع والمراجع والمراجع	i hele a li de la filita de la cale de la ca	ale at marking a part of the start of the	a sa		lite district	The set of the set of	The state of the second second	-
-57.1			and the second	d'and the second reality.	- 191				Freq Offset
									0 Hz
-67.1									
							04an 95		
Start 15.0		#\/D\M	200 64-			0	Stop 25	OUU GHZ	
#Res BW		#VBW	JUU KHZ			Sweep	950 ms (	800 r pts)	
MSG						STATUS	5		

(Plot 4.6.1 B6: Channel 6: 2437MHz @ 802.11b)