



# CERTIFICATION TEST REPORT

## FCC CFR47 PART 15 SUBPART C

Test Report File No.	13-IST-0217	<input checked="" type="checkbox"/> Basic	<input type="checkbox"/> Alternate
Date of Receipt	February 20, 2013	Begin of test date	February 26, 2013
Date of Issue	March 27, 2013	End of test date	March 12, 2013

Kind of Product	Portable Multimedia Player
Basic Model(s)	ITQ700
FCC ID	QDMITQ700

Applicant	IRIVER LIMITED.
Address	iriverhouse, 902-5, Bangbae-dong, Seocho-gu, Seoul, Korea
Manufacturer	IRIVER LIMITED.
Address	iriverhouse, 902-5, Bangbae-dong, Seocho-gu, Seoul, Korea

**Test Result**

**Positive**

**Negative**

Tested By

Reviewed By

B.O.KO

S.J.CHO

**Comment (s)**

- Investigations requested : Measurement to the relevant clauses of FCC rules and regulations Part 15 Subpart C.
- The test report is consists of 41 pages.
- The test result only responds to the tested sample.
- It is not allowed to copy this report even partly without the allowance of IST Co., Ltd.
- This equipment as for has been shown to be capable of continued compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4  
I assume full responsibility for accuracy and completeness of these data.



## TABLE OF CONTENTS

Table of contents	2
Information of test laboratory	3
Product Information	3~4
Measurement Uncertainty, Summary of the test results	5
- Conducted Emissions	6-10
- Peak Power Output	11-14
- Conducted Spurious Emissions & Band Edge	15-21
- 6dB BandWidth	22-25
- Power Spectral Density	26-29
- Radiated Emissions (Radiated Spurious & Restricted Band Edge)	30-40
- Antenna Requirements	41



## INFORMATION OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd.  
400-19, Singal-dong, Giheung-gu, Yongin-si,  
Gyeonggi-do, 446-599, Korea

TEL : +82 31 326 6700 FAX : +82 31 326 6797

KOLAS Testing No. : KT118  
RRA Designation No. : KR0018  
FCC Registration No. : 400603  
VCCI Member No. : 1739



## PRODUCT INFORMATION

### Portable Multimedia Player

		7inch
Product	Denomination	NA
	Region	Korea
Chipset	CPU	NVIDIA T30L Quad-core Cortex-A9 1.3/1.2GHz
	Audio Codec	Yes
OS	Android	Android 4.1 Jelly Bean
Memory	DRAM	1GB DDR3L
	eMMC	8GB/16GB
Display & TP module	LCD size & resolution	7" 1280x800 WXGA IPS
	TP Type	Capactive
	Multi-touch	Yes, 5-points gesture
Camera	Front	2M (Fixed Focus)
	Rear	N/A
Audio I/O	Microphone	Yes
	Speakers	Stereo, built-in
Connectivity	WiFi	Yes, 802.11b/g/n, TI WL1281
	Bluetooth	Yes, BT4.0 BLE, TI WL1281
	GPS	Yes, TI WL1281
	3G/LTE	Optional
Sensors	Ambient Light Sensor	No
	Proximity	No
	3-axis Accelerometer	Yes, ST LSM303D
	e-Compass	Yes, ST LSM303D



	Gyroscope	No
Codec	Audio	Check T30L Codec sheet
	Image	
	Video	
Buttons	Physical Buttons	Power, Volume Up, Volume Down
	Virtual Key (labeled on TP)	No
Battery	Capacity	4000mAH Li-Polymer (base on ID)
SIM Card	SIM Card Socket	Yes, for 3G model
External Interfaces	MicroSD slot	Yes, up to 32GB microSDHC
	Earphone jack	Yes, 3.5mm
	DC-Jack (charging)	No
	MicroUSB	Yes. Slave, support charging thru USB adapter
	Mini HDMI	Yes
	System Docking Connector	No
Certifications	CE	Yes
	FCC	Yes
	RoHS	Yes
	GMS	No
Service	OTA update	Yes

**Note:** All the testing were performed according to the procedures in  
FCC CFR47 PART 15 SUBPART C



## Measurement Uncertainty

Conducted Emissions	$U = 2.98$ [dB] (Confidence level approximately 95 %, $k = 2$ )
Radiated Emissions (Antenna - Horizontal)	$U = 3.83$ [dB] (Confidence level approximately 95 %, $k = 2$ )
Radiated Emissions (Antenna - Verical)	$U = 4.50$ [dB] (Confidence level approximately 95 %, $k = 2$ )

## SUMMARY

WLAN(2412 MHz ~ 2462 MHz)

Applied Standard : FCC CRF Part 15 Subpart C

Standard Section	Description	result	remark
15.207	AC Conducted Emission	Pass	Meet the requirements
15.209	Field Strength of Harmonics	Pass	Meet the requirements
15.247(b)	Peak Power Output	Pass	Meet the requirements
15.247(d)	Conducted Band Edges	Pass	Meet the requirements
	Conducted Spurious Emission	Pass	Meet the requirements
	Radiated Band Edges	Pass	Meet the requirements
	Radiated Spurious Emission	Pass	Meet the requirements
15.247(a)(2)	6dB Bandwidth	Pass	Meet the requirements
15.247(e)	Power Spectral Density	Pass	Meet the requirements
15.203 & 15.247(b)	Antenna requirement	-	Meet the requirements

### Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the Following standards:

- ✧ FCC Part 15 Subpart C § 15.247
- ✧ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
- ✧ FCC TCB Workshop 2013, April 9.
- ✧ ANSI C63.4-2003 and ANSI C63.10-2009

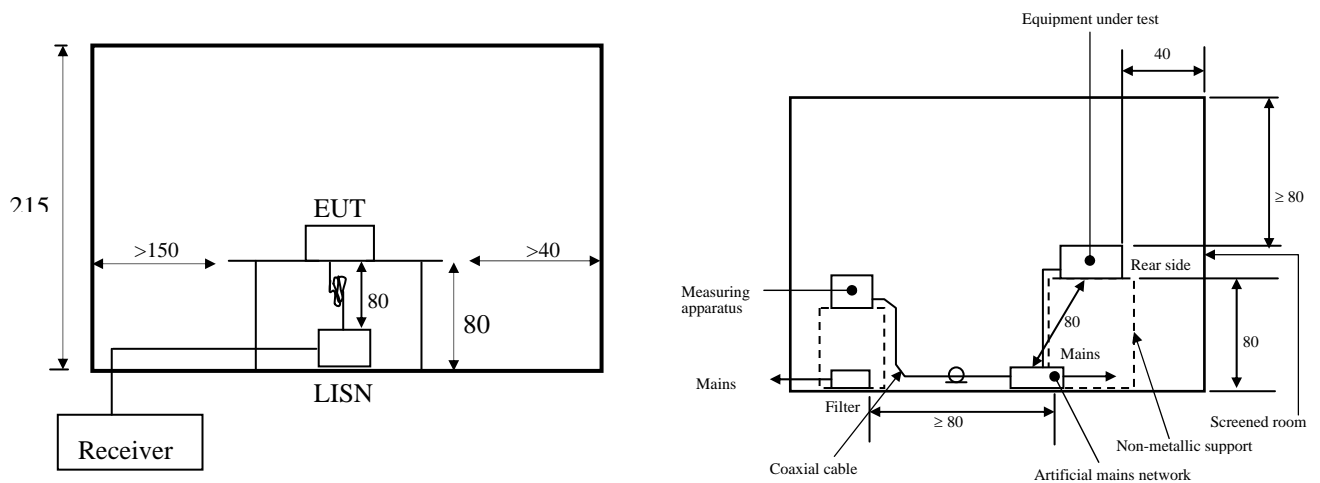


## Conducted Emissions:

The measurement were performed over the frequency range of 0.15 MHz to 30 MHz using a 50  $\Omega$ /50  $\mu$ H LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10 kHz or for "quasi-peak" & "Average" within a bandwidth of 9 KHz.

### -Procedure of Test

The line-conducted facility is located inside a shielded room No.1. A 1 m X 1.5 m wooden table 80 cm height is placed 40 cm away from the vertical wall and 1.5 m away from the other wall of the shielded room. The R/S ESCI and Hyup-Rip KNW-407 LISN are bonded to bottom of the shielded room. The EUT is located on the wooden table with distance more than 80 cm from the LISN and powered from the EMCO LISN .The peripheral equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner  $\phi$  1.2 cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the EMCO LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling to a 1m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating conditions. The RF output of the LISN was connected to the R/S receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using Quasi-Peak mode by manual measurement, after scanned by automatic Peak mode for frequency range from 0.15 to 30 MHz. The bandwidth of the receiver was set to 10 kHz. The EUT, peripheral equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.



< Side View >

< Concept Drawing >



## Limits

According to §15.207(a) except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network(LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

\* Decreases with the logarithm of the frequency.

Test specification.

According to FCC CFR Title 47 Part 15 Subpart C Section 15.207



## Conducted Emissions

[Applicable]

◆ Test Equipment Used

Model Name	Description	Manufacturer	Calibration Date	Serial No.
ESCI	Test Receiver	Rohde & Schwarz	May. 10, 2014	100374
ESH2-Z5	LISN	Rohde & Schwarz	May. 10, 2014	842966/007
ESH3-Z2	Pulse Limiter	Rohde & Schwarz	May. 10, 2014	357.8810.52

◆ Test Accessories Used

Equipment	Type	Brand	Serial No.
ITQ700	ITQ700	IRIVER LIMITED.	N/A
AC ADAPTER	KSAPK0110500200HO	KUANTECH (BEIHAI) CO, .LTD	N/A
Micro SD Card	N/A	SANDISK	N/A
BLUETOOTH SPEAKER	XAM11	X-MINI	N/A

Connecting Interface Cables :

AC Power Cable : 1.0 m

◆ Test Conditions

Temperature ( 17.8 ) °C  
Humidity ( 47.7 ) % R.H.  
Atomosphere ( 1016 ) mbar

◆ Test Date February 26, 2013

◆ Test Area Conducted Room #2

Note : The equipment used is calibrated in regular for every year.





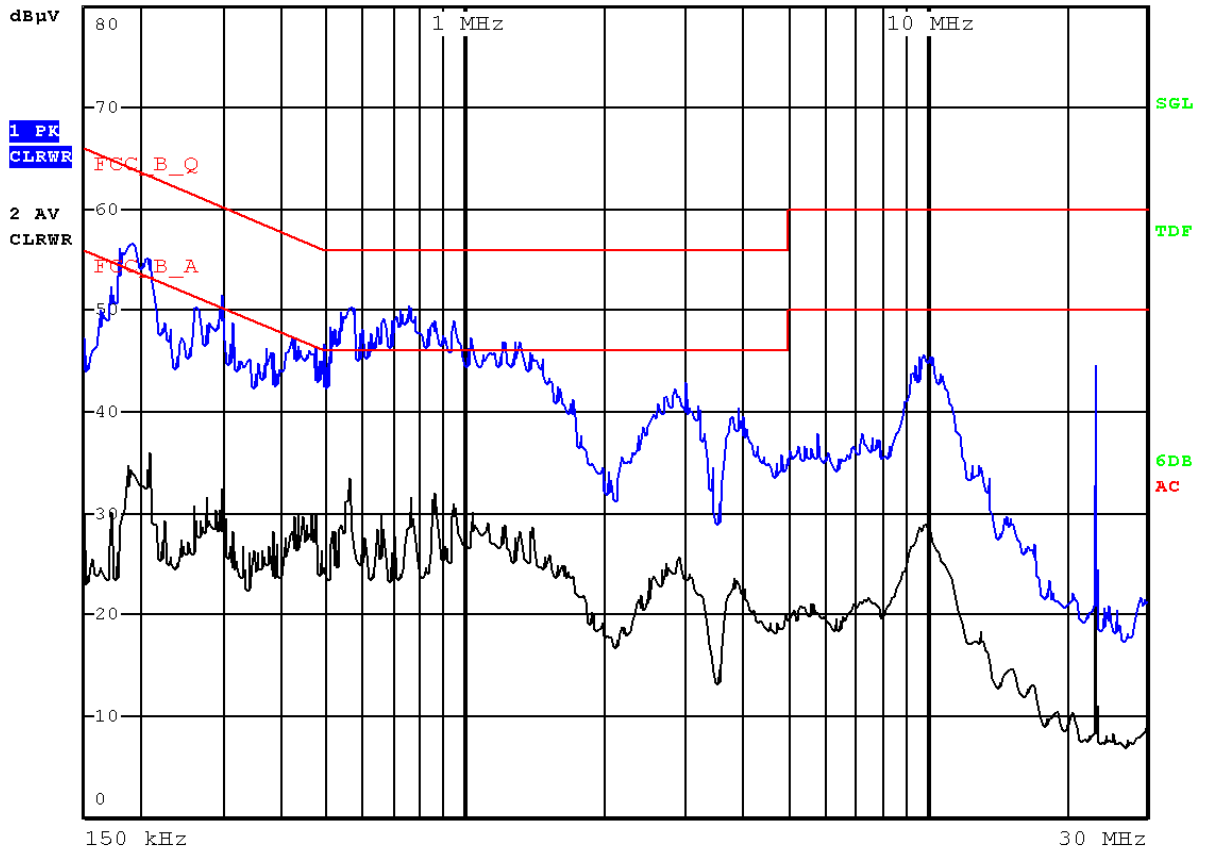
### Conducted Emissions result

Live



RBW 9 kHz  
MT 160 ms  
PREAMP OFF

Att 10 dB



150 kHz Model Name: ITQ700 120 Vac 60 Hz Live 30 MHz

Freq. [MHz]	Measurement [dB µV]		Limit [dB µV]		Insertion Loss [dB]	Cable Loss [dB]	Result [dB µV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.190	51.82	33.87	64.04	54.04	0.16	0.02	52.00	34.05	12.04	19.99
0.294	46.13	30.36	60.41	50.41	0.16	0.03	46.32	30.55	14.09	19.86
0.758	46.64	30.04	56.00	46.00	0.18	0.05	46.87	30.27	9.13	15.73
3.010	35.14	23.52	56.00	46.00	0.27	0.07	35.48	23.86	20.52	22.14
9.894	39.73	27.45	60.00	50.00	0.48	0.14	40.35	28.07	19.65	21.93
23.294	16.56	9.57	60.00	50.00	0.06	0.20	16.82	9.83	43.18	40.17



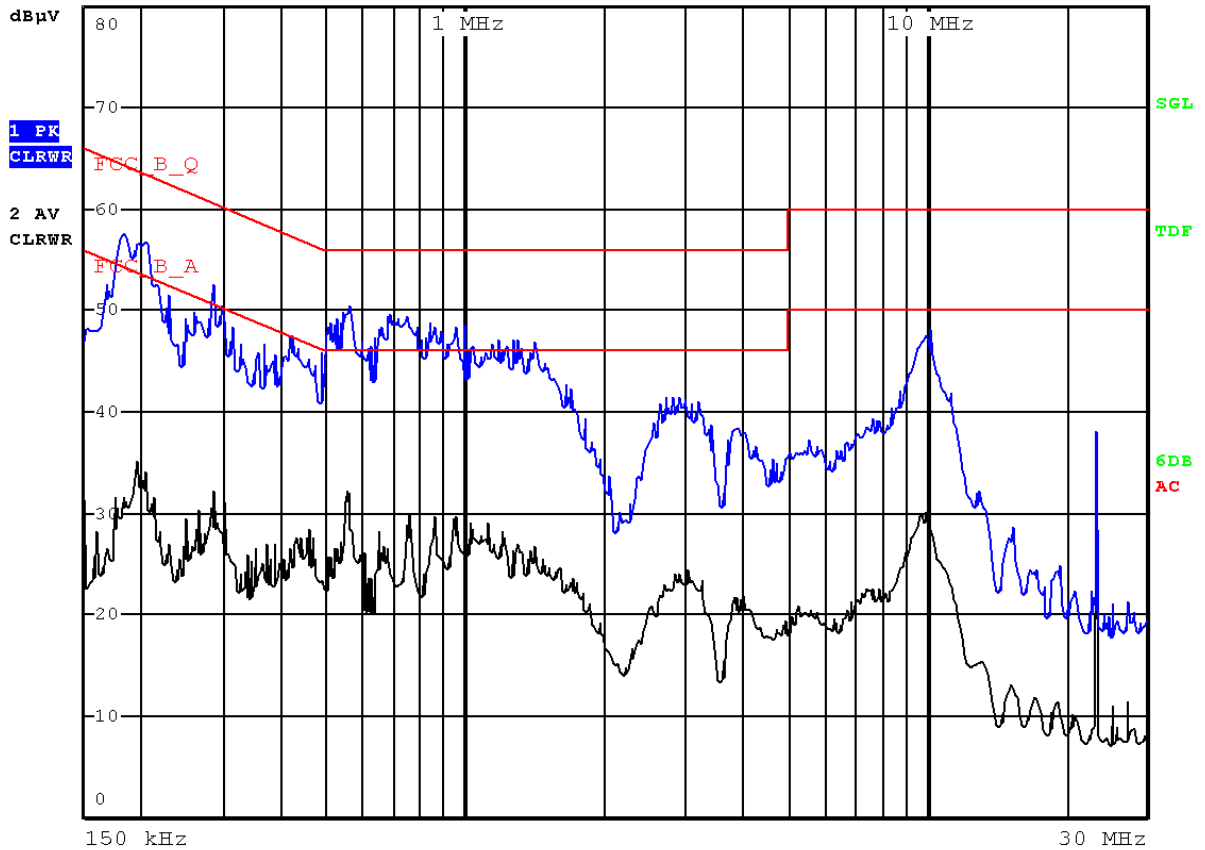
### Conducted Emissions result

Neutral



RBW 9 kHz  
MT 160 ms  
PREAMP OFF

Att 10 dB



Model Name: ITQ700      120 Vac    60 Hz      Neutral

Freq. [MHz]	Measurement [dB µV]		Limit [dB µV]		Insertion Loss [dB]	Cable Loss [dB]	Result [dB µV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.182	52.58	32.74	64.39	54.39	0.12	0.02	52.72	32.88	11.67	21.51
0.282	45.73	30.52	60.76	50.76	0.13	0.03	45.88	30.67	14.87	20.08
0.562	46.81	31.16	56.00	46.00	0.14	0.03	46.98	31.33	9.02	14.67
2.826	35.13	22.67	56.00	46.00	0.23	0.07	35.43	22.97	20.57	23.03
10.138	40.72	27.74	60.00	50.00	0.46	0.14	41.32	28.34	18.69	21.67
23.350	13.87	8.52	60.00	50.00	0.14	0.20	14.20	8.85	45.80	41.15



## Peak Power Output

### ◆ Test Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model no/Serial No.	Last Cal.
1	Counter/Power Meter	HP	5348A / 3009A01264	Oct. 10, 2013
2	Power Sensor	HP	8481A / US37293757	Oct. 10, 2013
3	RF ROOM			

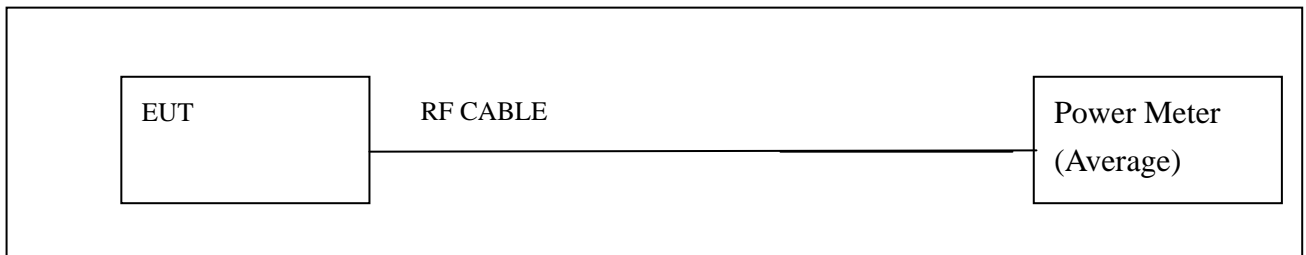
Note : All equipment upon which need to calibrated are with calibration period of 1 year.

### ◆ Limits

The maximum peak output power of the intentional radiator shall not exceed the following :

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz : 1Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph(b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph(c) of this section, is transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs(b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi

### ◆ Test Setup



### ◆ Test Procedure

1. The transmitter output is connected to the Spectrum analyzer. The Power meter is set to the Average power detection.
2. The testing follows the Measurement Procedure FCC KDB No. 558074 D01 DTS Meas. Guidance v03r01



### Peak Power Test result

Product	ITQ700
Test Method	Measurement using an RF average power meter
Test Mode	Transmit
Test Site	RF Room
Measurement Method	Conducted

802.11b Mode		Rate (Mbps)	Measure Power (dBm)	Limit (dBm)
Frequency (MHz)	Channel No.			
2412	1	1 Mbps	14.27	1Watt=30dBm
		2 Mbps	14.10	1Watt=30dBm
		5.5 Mbps	13.91	1Watt=30dBm
		11 Mbps	14.02	1Watt=30dBm
2437	6	1 Mbps	14.10	1Watt=30dBm
		2 Mbps	14.06	1Watt=30dBm
		5.5 Mbps	13.87	1Watt=30dBm
		11 Mbps	13.78	1Watt=30dBm
2462	11	1 Mbps	14.01	1Watt=30dBm
		2 Mbps	13.85	1Watt=30dBm
		5.5 Mbps	13.73	1Watt=30dBm
		11 Mbps	13.79	1Watt=30dBm

802.11b(Duty Cycle)	On time	On + Off time	Duty	10log(1/x)
Antenna power 1Mbps	8.280 ms	8.360 ms	0.99	0.04
Antenna power 2Mbps	4.280 ms	4.320 ms	0.99	0.04
Antenna power 5.5Mbps	1.684 ms	1.713 ms	0.98	0.09
Antenna power 11Mbps	0.939 ms	0.966 ms	0.97	0.13

Note : Measurement Power = reading level + correct factor + Duty Cycle



802.G Mode		Rate (Mbps)	Measure Power (dBm)	Limit (dBm)
Frequency (MHz)	Channel No.			
2412	1	6 Mbps	13.69	1Watt=30dBm
		9 Mbps	14.01	1Watt=30dBm
		12 Mbps	13.94	1Watt=30dBm
		18 Mbps	13.83	1Watt=30dBm
		24 Mbps	13.92	1Watt=30dBm
		36 Mbps	13.64	1Watt=30dBm
		48 Mbps	12.23	1Watt=30dBm
		54 Mbps	12.23	1Watt=30dBm
2437	6	6 Mbps	13.66	1Watt=30dBm
		9 Mbps	13.93	1Watt=30dBm
		12 Mbps	13.80	1Watt=30dBm
		18 Mbps	13.87	1Watt=30dBm
		24 Mbps	13.84	1Watt=30dBm
		36 Mbps	13.61	1Watt=30dBm
		48 Mbps	12.32	1Watt=30dBm
		54 Mbps	12.14	1Watt=30dBm
2462	11	6 Mbps	13.52	1Watt=30dBm
		9 Mbps	13.82	1Watt=30dBm
		12 Mbps	13.92	1Watt=30dBm
		18 Mbps	13.73	1Watt=30dBm
		24 Mbps	13.80	1Watt=30dBm
		36 Mbps	13.57	1Watt=30dBm
		48 Mbps	12.11	1Watt=30dBm
		54 Mbps	11.98	1Watt=30dBm

802.11G(Duty Cycle)	Rate	Duty	10log(1/x)
Antenna power	6 Mbps	0.98	0.04
Antenna power	9 Mbps	0.96	0.18
Antenna power	12 Mbps	0.96	0.18
Antenna power	18 Mbps	0.94	0.27
Antenna power	24 Mbps	0.92	0.36
Antenna power	36 Mbps	0.89	0.5
Antenna power	48 Mbps	0.86	0.66
Antenna power	54 Mbps	0.85	0.71

Note : Measurement Power = reading level + correct factor + Duty Cycle



802.N Mode (HT20)		Rate (Mbps)	Measure Power (dBm)	Limit (dBm)
Frequency (MHz)	Channel No.			
2412	1	6.5 Mbps	13.67	1Watt=30dBm
		13 Mbps	13.93	1Watt=30dBm
		19.5 Mbps	14.00	1Watt=30dBm
		26 Mbps	13.59	1Watt=30dBm
		39 Mbps	13.86	1Watt=30dBm
		52 Mbps	12.15	1Watt=30dBm
		58.5 Mbps	12.17	1Watt=30dBm
		65 Mbps	11.33	1Watt=30dBm
2437	6	6.5 Mbps	13.65	1Watt=30dBm
		13 Mbps	13.71	1Watt=30dBm
		19.5 Mbps	13.81	1Watt=30dBm
		26 Mbps	13.88	1Watt=30dBm
		39 Mbps	13.82	1Watt=30dBm
		52 Mbps	12.07	1Watt=30dBm
		58.5 Mbps	12.20	1Watt=30dBm
		65 Mbps	10.87	1Watt=30dBm
2462	11	6.5 Mbps	13.55	1Watt=30dBm
		13 Mbps	13.69	1Watt=30dBm
		19.5 Mbps	13.60	1Watt=30dBm
		26 Mbps	13.77	1Watt=30dBm
		39 Mbps	13.64	1Watt=30dBm
		52 Mbps	11.98	1Watt=30dBm
		58.5 Mbps	11.28	1Watt=30dBm
		65 Mbps	11.24	1Watt=30dBm

802.11G(Duty Cycle)	Rate	Duty	10log(1/x)
Antenna power	6.5 Mbps	0.97	0.13
Antenna power	13 Mbps	0.96	0.18
Antenna power	19.5 Mbps	0.94	0.27
Antenna power	26 Mbps	0.92	0.36
Antenna power	39 Mbps	0.89	0.51
Antenna power	52 Mbps	0.86	0.66
Antenna power	58.5 Mbps	0.85	0.71
Antenna power	65 Mbps	0.85	0.71

Note : Measurement Power = reading level + correct factor + Duty Cycle



## Conducted Spurious Emissions & Band Edge

◆ TEST Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model no/Serial No.	Last Cal.
1	Spectrum Analyzer	ADVANTEST	R3273 / 95090431	Oct. 10, 2013
2	RF ROOM			

Note : 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRL, KRISS, KTL and HCT.

◆ 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 emission 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)).

◆ Test Setup



◆ Test Procedure

1. The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

2. The testing follows the Measurement Procedure FCC KDB No. 558074 D01 DTS Meas. Guidance v03r01

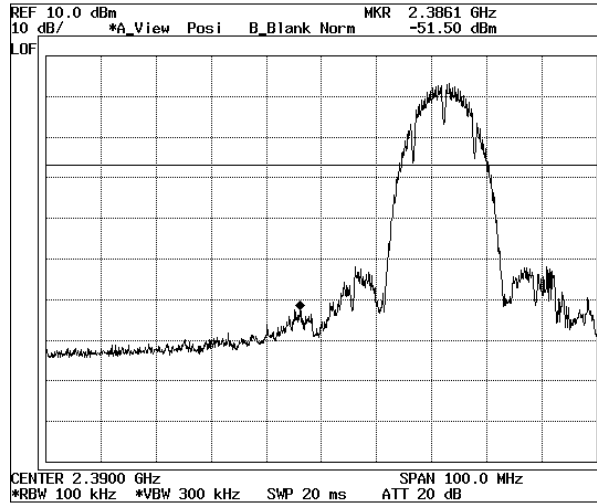


### Band Edge Test result

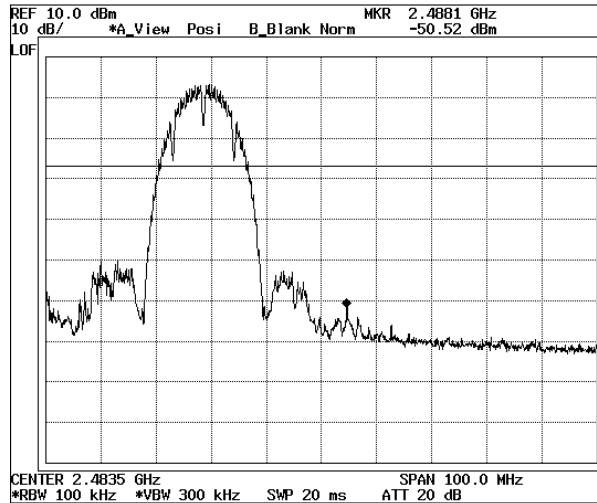
Product	ITQ700
Test Item	Band Edge
Test Mode	Transmit Low/High
Test Site	RF Room
Measurement Method	Conducted

● **802.11b**

Low (2412 MHz)



High (2462 MHz)



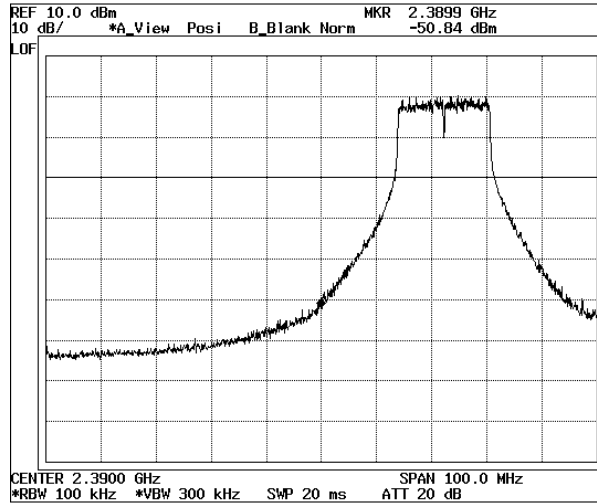
Note : Measurement level = reading level + correct factor



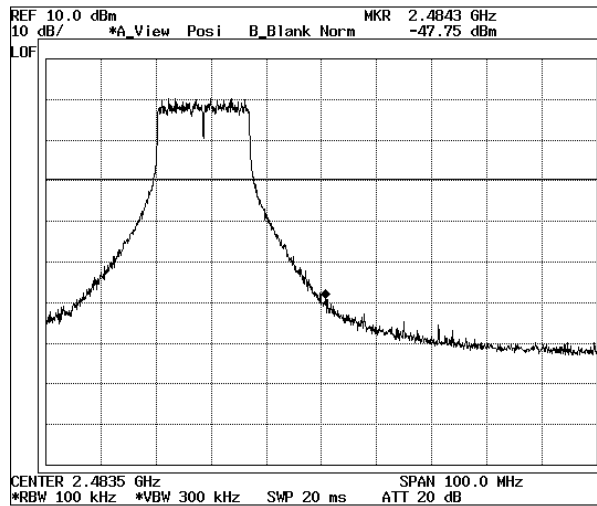


● 802.11g

Low (2412 MHz)



High (2462 MHz)

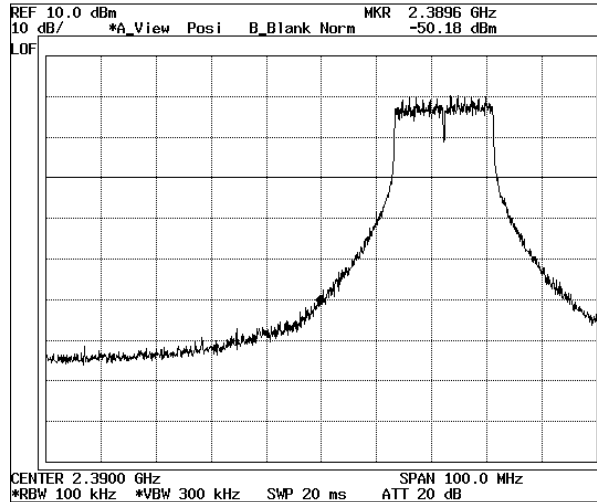


Note : Measurement level = reading level + correct factor

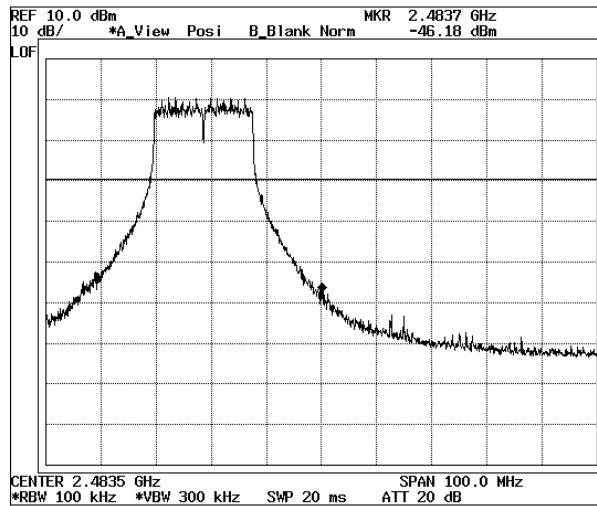


● 802.11n

Low (2412 MHz)



High (2462 MHz)



Note : Measurement level = reading level + correct factor

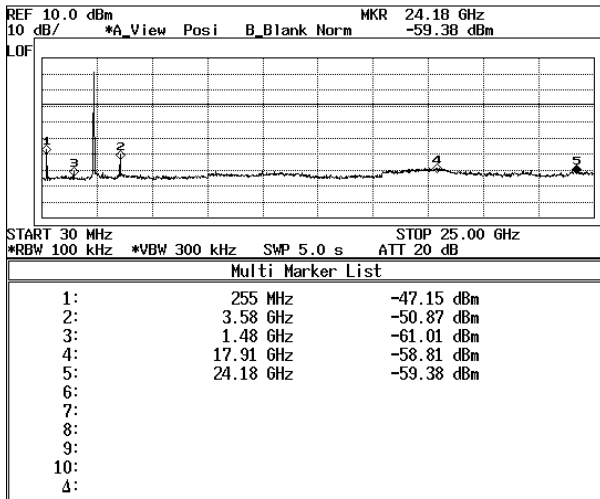


## Spurious Emission Test result

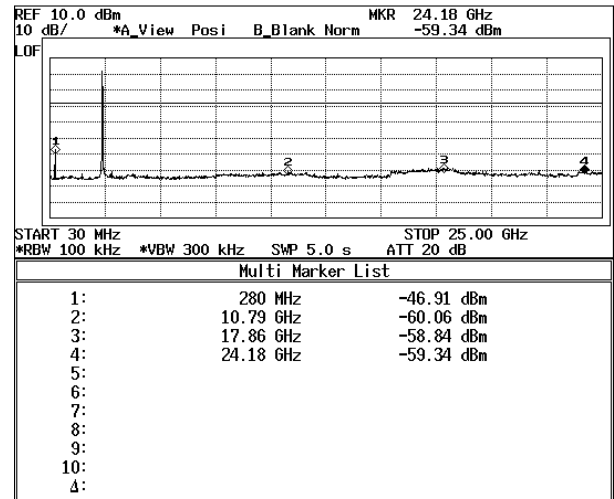
Product	ITQ700
Test Item	Spurious (30 MHz ~ 25 GHz)
Test Mode	Transmit Low/Mid/High
Test Site	RF Room
Measurement Method	Conducted

### ● 802.11b

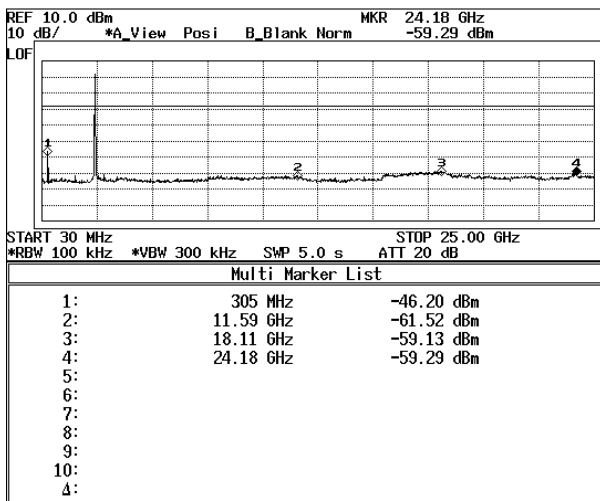
Low (2412 MHz)



Mid (2437 MHz)



High (2462 MHz)

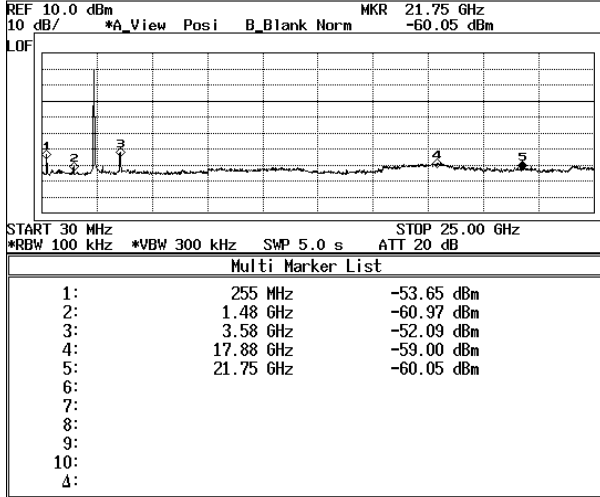


Note : Measurement level = reading level + correct factor

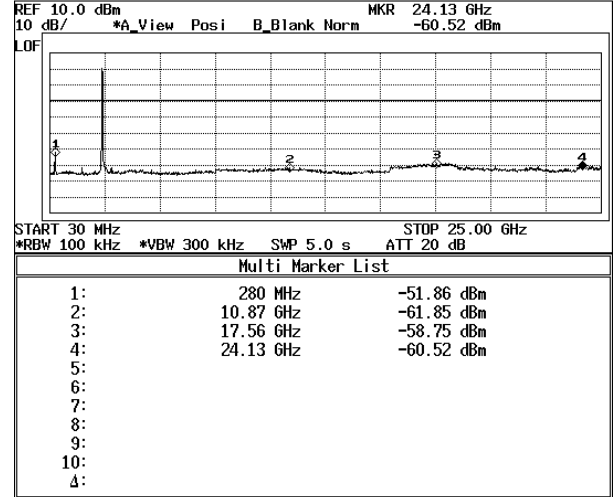


● 802.11g

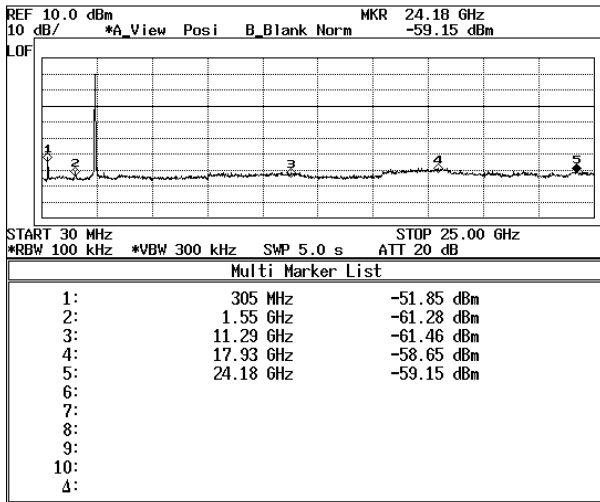
Low (2412 MHz)



Mid (2437 MHz)



High (2462 MHz)

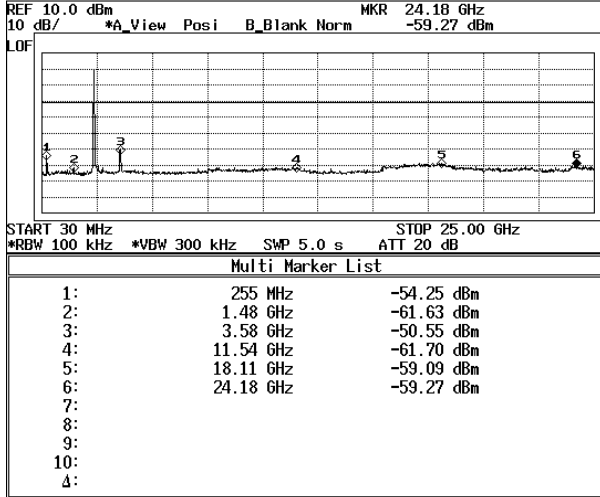


Note : Measurement level = reading level + correct factor

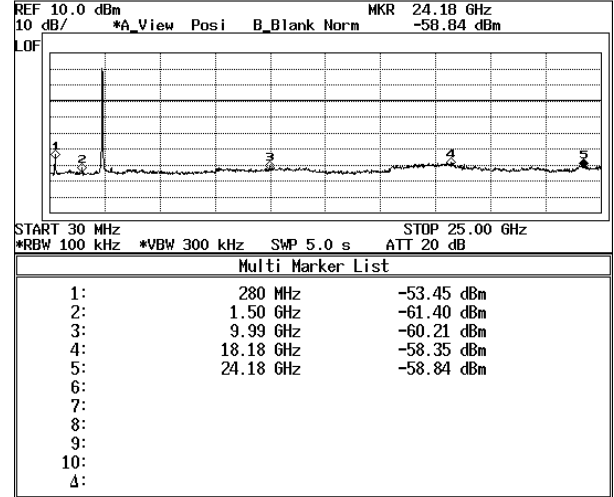


● 802.11n

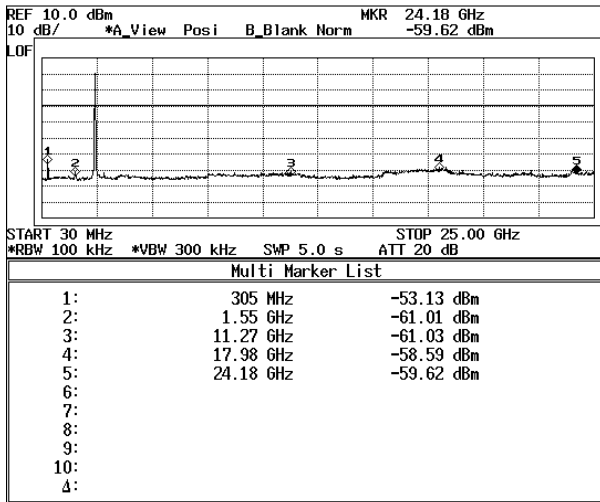
Low (2412 MHz)



Mid (2437 MHz)



High (2462 MHz)



Note : Measurement level = reading level + correct factor



## 6dB BandWidth

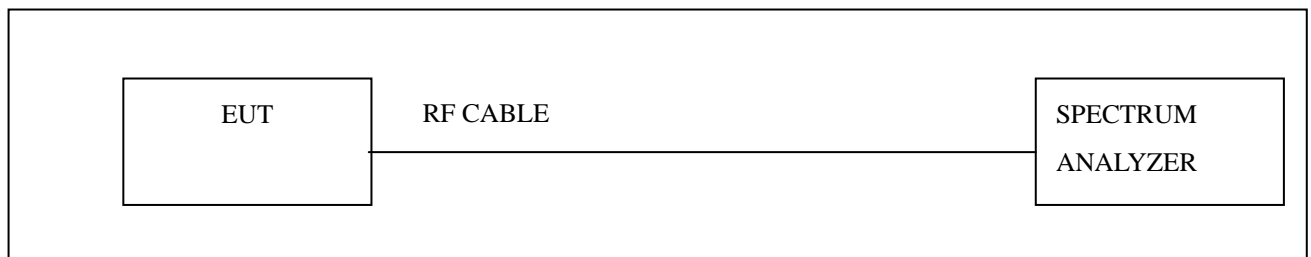
### ◆ Test Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model no/Serial No.	Last Cal.
1	Spectrum Analyzer	ADVANTEST	R3273 / 95090431	Oct.10, 2013
2	RF ROOM			

Note : All equipment upon which need to calibrated are with calibration period of 1 year.

### ◆ Test Setup



### ◆ Limits

(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions :

(2) systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### ◆ Test Procedure

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas.

Guidance v03r01 and TCB Workshop 2013, April 9.

2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable. The path loss was compensated to the results for each measurement.

3. Make the measurement with the spectrum analyzer`s resolution bandwidth (RBW) = 1-5% of the emission bandwidth (EBW). Set the Video bandwidth (VBW) > 3 \*RBW. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 KHz

4. The marker-delta reading at this point is the 6dB bandwidth of the emission.

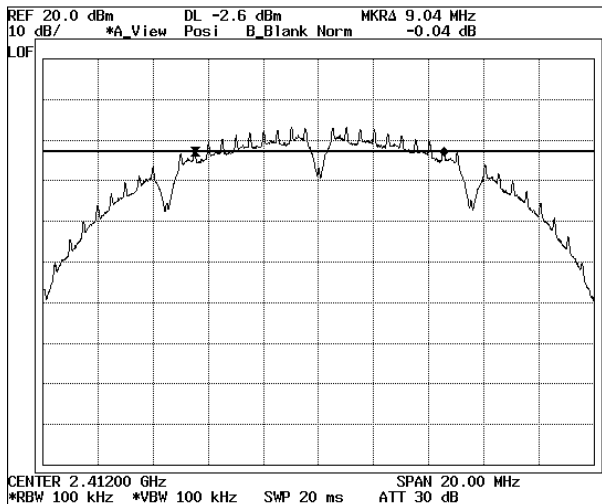


## Test result

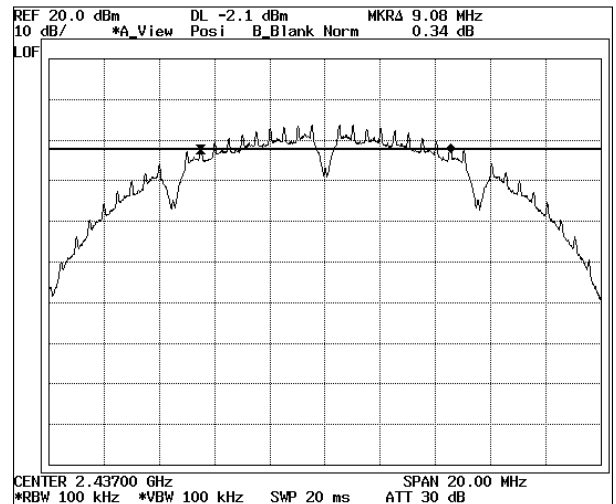
Product	ITQ700
Test Item	6dB Band
Test Mode	Transmit
Test Site	RF Room
Measurement Method	Conducted

802.11b				
Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (KHz)	Result
Low	2412	9.04	>500	Pass
Mid	2437	9.08	>500	Pass
High	2462	9.04	>500	Pass

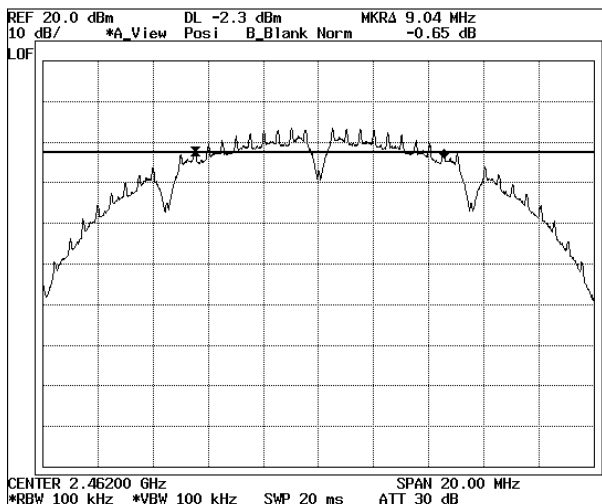
Low (2412 MHz)



Mid (2437 MHz)



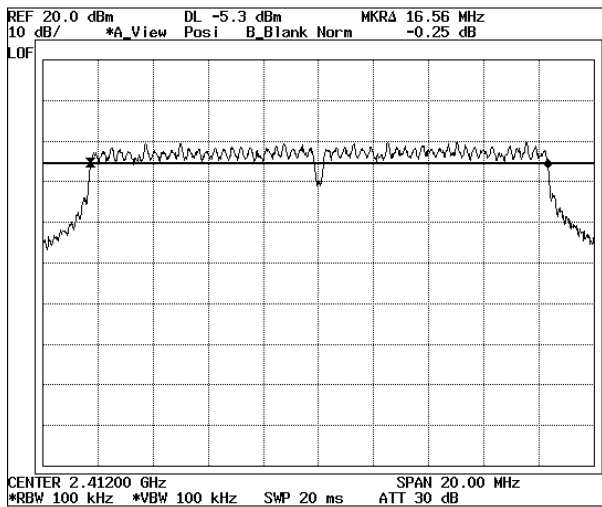
High (2462 MHz)



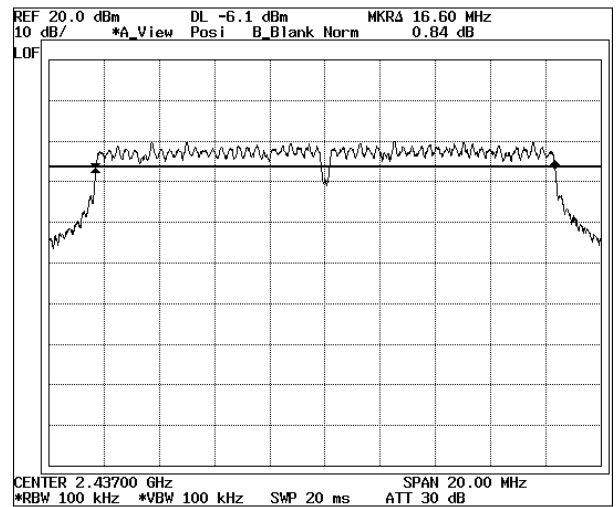


802.11g				
Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (KHz)	Result
Low	2412	16.56	>500	Pass
Mid	2437	16.60	>500	Pass
High	2462	16.58	>500	Pass

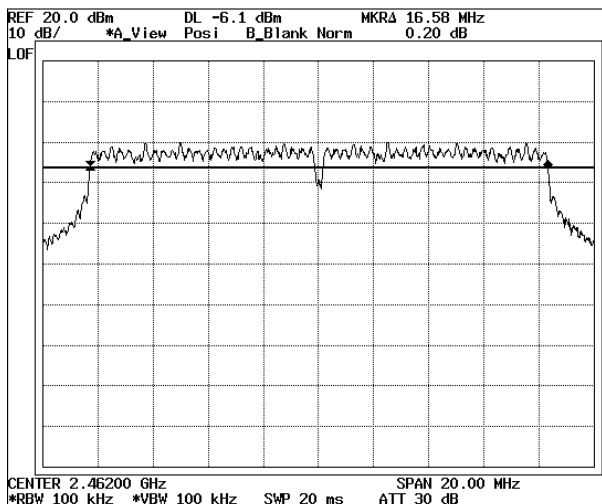
Low (2412 MHz)



Mid (2437 MHz)



High (2462 MHz)



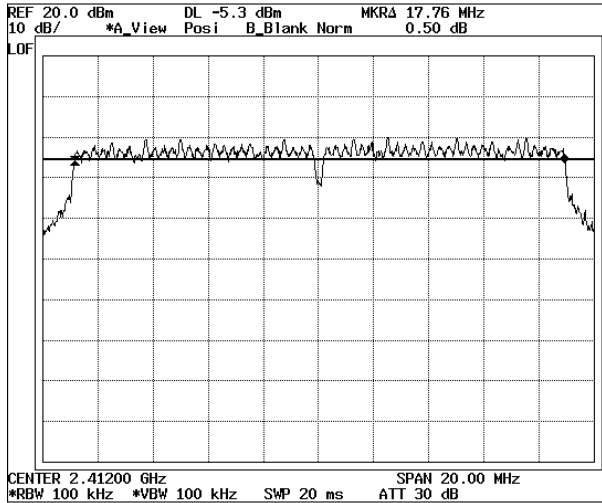
Note : Measurement level = reading level + correct factor



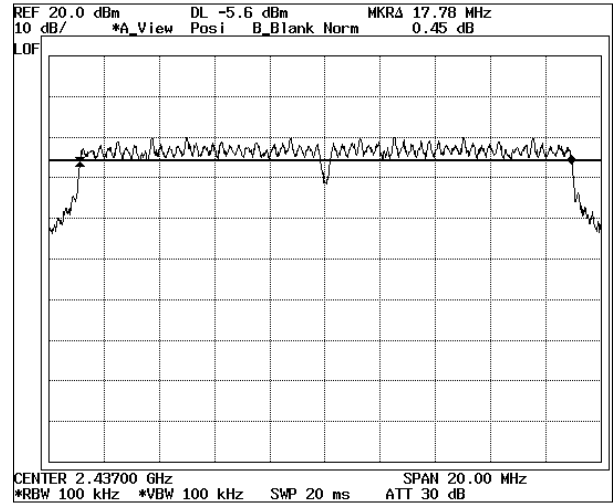


802.11n				
Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (KHz)	Result
Low	2412	17.76	>500	Pass
Mid	2437	17.78	>500	Pass
High	2462	17.78	>500	Pass

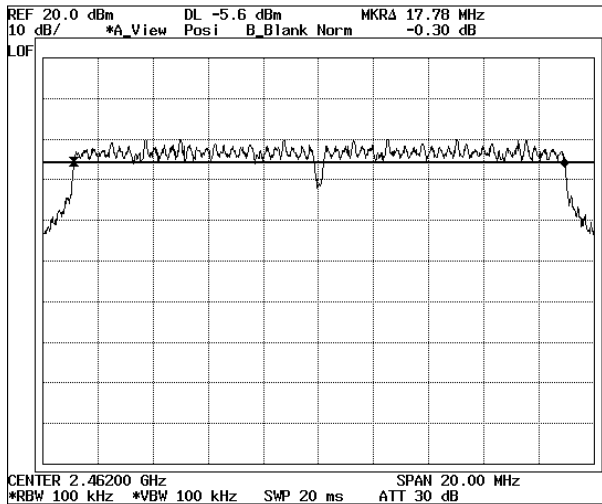
Low (2412 MHz)



Mid (2437 MHz)



High (2462 MHz)



Note : Measurement level = reading level + correct factor



## Power Spectral Density

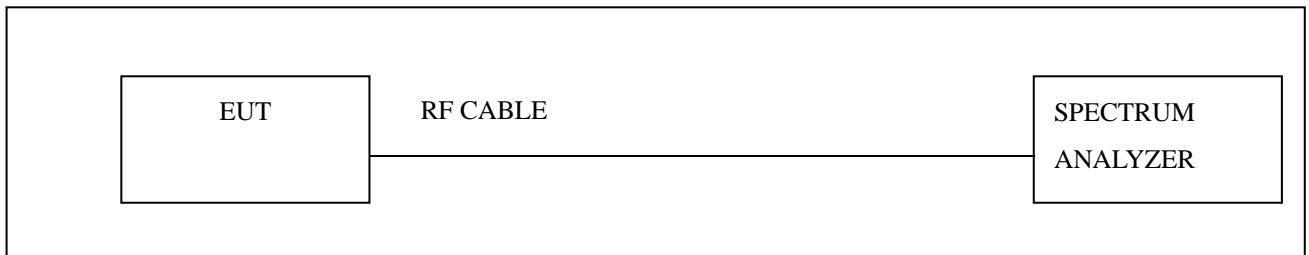
### ◆ Test Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model no/Serial No.	Last Cal.
1	Spectrum Analyzer	ADVANTEST	R3273 / 95090431	Oct. 10, 2013
2	RF ROOM			

Note : All equipment upon which need to calibrated are with calibration period of 1 year.

### ◆ Test Setup



### ◆ Limits

Section 15.247 (e) 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. This power spectral density shall be determined in accordance with the provisions of paragraph (v) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### ◆ Test Procedure

The Measurement Procedure PKPSD was set according to the FCC KDB 558074 D01 DTS Meas. Guidance v03r01. Use the peak marker function to determine the maximum power level in any 3 kHz band segment within the fundamental RBW.

(VBW  $\geq$  3 xRBW, Sweep time = auto couple, Trace mode = Max hold)

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

Limit: The Power Density does not exceed 8dBm/ 3 kHz.



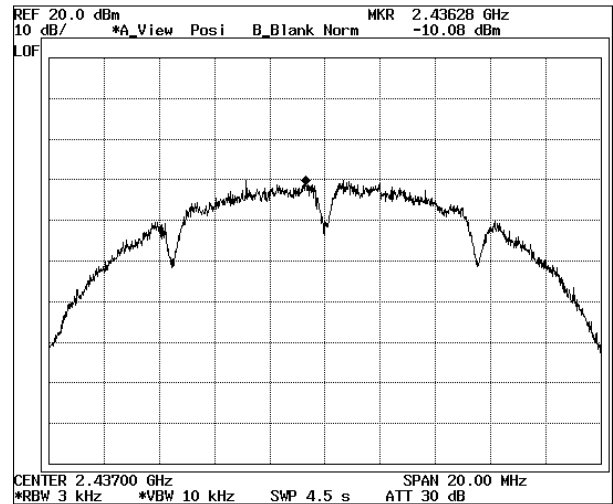
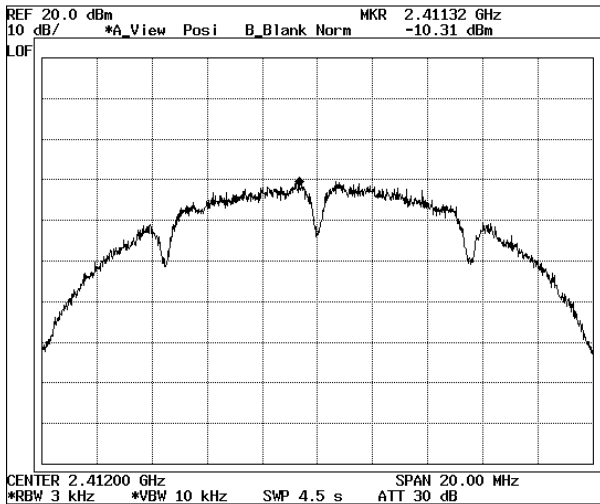
## Test result

Product	ITQ700
Test Item	Power Spectral Density
Test Mode	Transmit
Test Site	RF Room
Measurement Method	Conducted

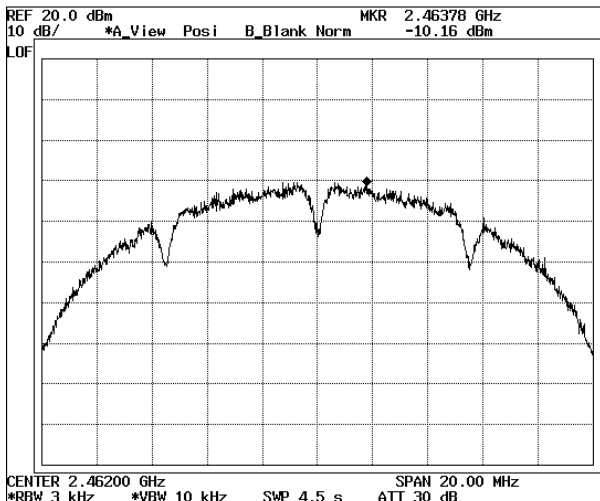
802.11b				
Channel	Frequency (MHz)	PSD/3KHz (dBm)	Limit (dBm)	Result
Low	2412	-10.31	< 8	Pass
Mid	2437	-10.08	< 8	Pass
High	2462	-10.16	< 8	Pass

Low(2412 MHz)

Mid(2442 MHz)



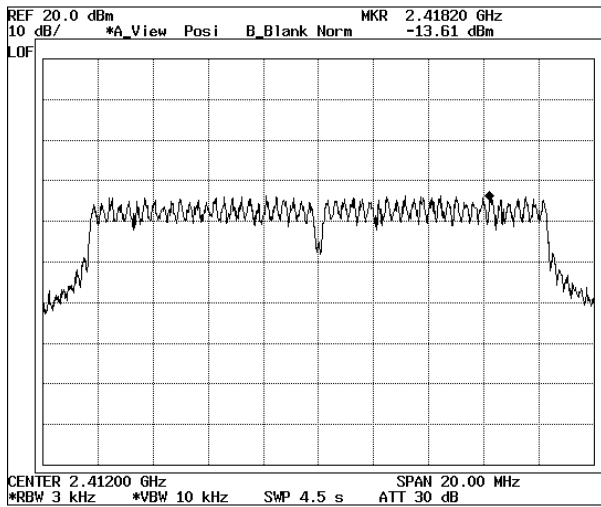
High(2462 MHz)



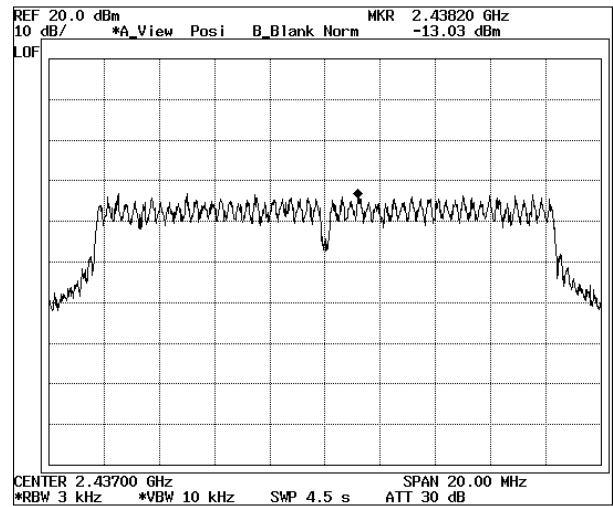


802.11g				
Channel	Frequency (MHz)	PSD/3KHz (dBm)	Limit (dBm)	Result
Low	2412	-13.61	< 8	Pass
Mid	2437	-13.03	< 8	Pass
High	2462	-12.76	< 8	Pass

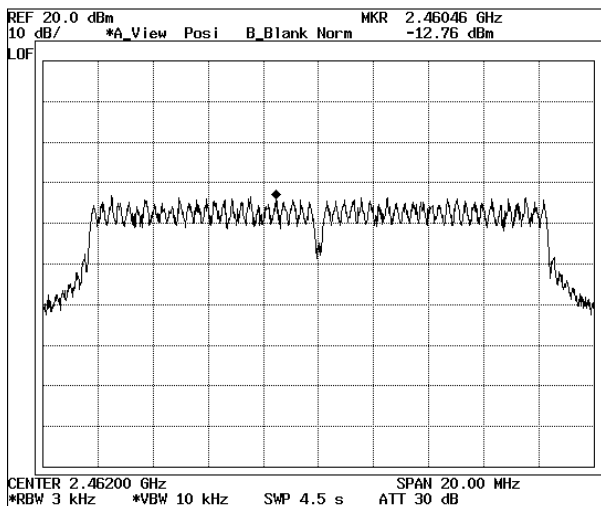
Low (2412 MHz)



Mid (2442 MHz)



High (2462 MHz)

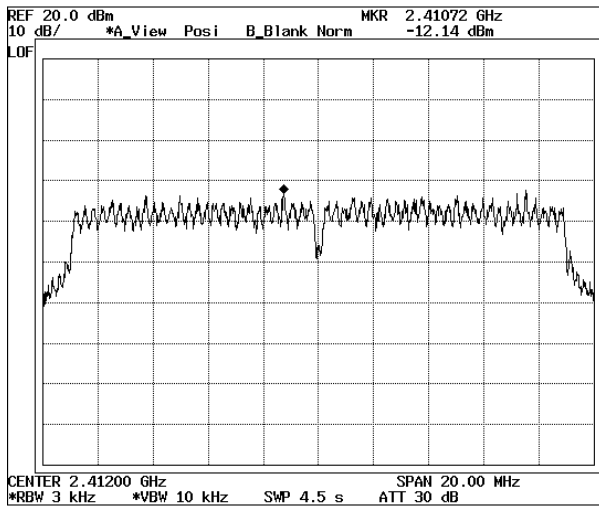


Note : Measurement level = reading level + correct factor

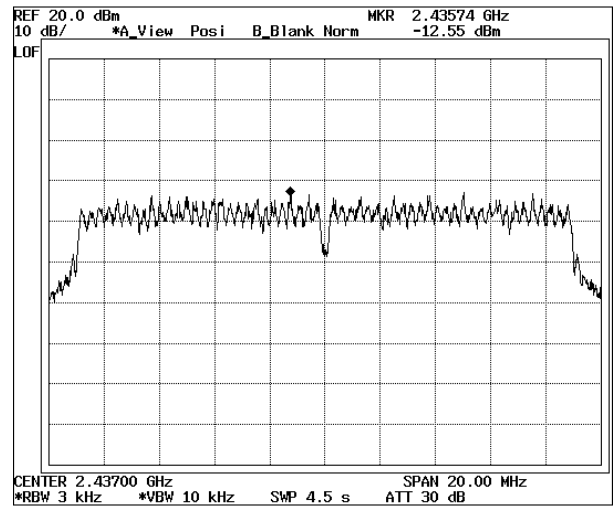


802.11n				
Channel	Frequency (MHz)	PSD/3KHz (dBm)	Limit (dBm)	Result
Low	2412	-12.14	< 8	Pass
Mid	2437	-12.55	< 8	Pass
High	2462	-12.25	< 8	Pass

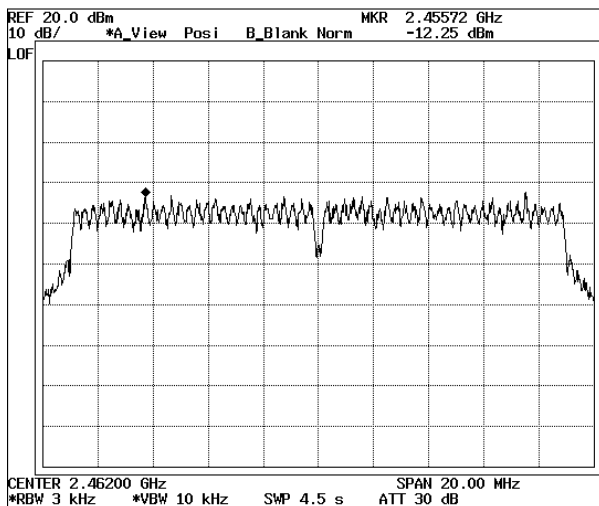
Low (2412 MHz)



Mid (2437 MHz)



High (2462 MHz)



Note : Measurement level = reading level + correct factor



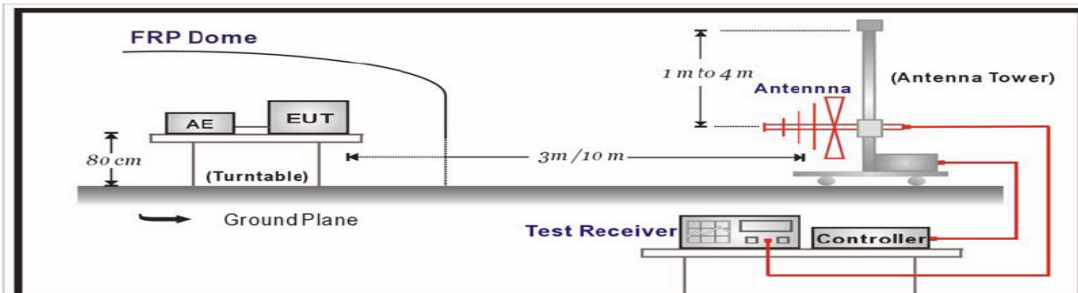
## Radiated Emissions:

The measurement was performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120kHz.

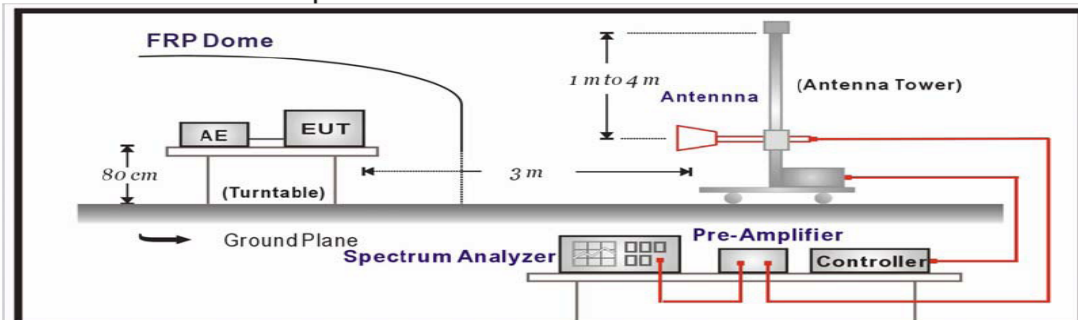
### Procedure of Test

Preliminary measurements were made at 3 meter using bi-log antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30MHz to 1000MHz using bi-log antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using bi-log antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuation. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission. (The bandwidth below 1GHz setting on the field strength meter is 120KHz and above 1GHz is 1MHz.)

Under 1GHz Test Setup:

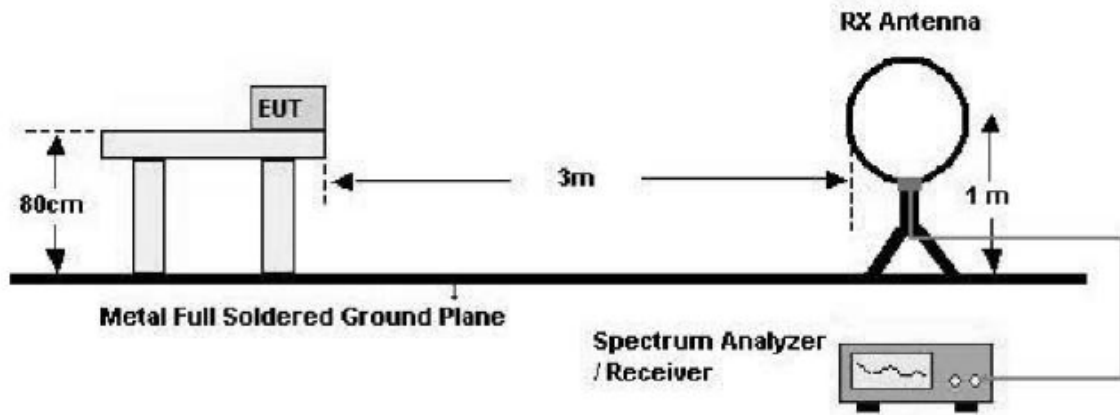


Above 1GHz Test Setup:





**Below 30 MHz**



**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 Section 15.209 Limits		
Frequency (MHz)	$\mu\text{V}/\text{meter}$	$\text{dB}\mu\text{V}/\text{meter} (3\text{m})$
0.009-0.490	$2400/F(\text{KHz})$ at 300 m	$20\log 2400/F(\text{KHz})+80$
0.490-1.705	$24000/F(\text{KHz})$ at 30m	$20\log 24000/F(\text{KHz})+40$
1.705-30	30 at 30 m	49.5
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks :

1.  $\text{RF Voltage}(\text{dB}\mu\text{v})=20\log \text{RF Voltage}(\mu\text{v})$
2.  $\text{dB}\mu\text{V}/\text{m} = \text{ERP}(\text{dBm})+106.92 \text{ dB} + 20\log(10\text{m}/3\text{m}) + 2.15\text{dB}(\text{conversion Factor for E.I.R.P})$
3. In the Above Table, the tighter limit applies at the band edges.
4. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Test specification.

According to FCC CFR Title 47 Part 15 Subpart C Section 15.209



**Radiated Spurious Emission**  
**& Radiated Restricted Band Edge**

[Applicable]

◆ Test Equipment Used

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESCS30	EMI Receiver	Rohde & Schwarz	May. 10, 2014	100171
ESCI7	EMI Receiver	Rohde & Schwarz	July. 16, 2013	100872
SPECTRUM ANALYZER	R3273	ADVANTEST	May. 09, 2014	110600587
Loop Antenna	HFH2-Z2	Rohde & Schwarz	Oct. 26, 2014	8620771017
Log-bicon Antenna	VULB9161SE	Schwarz beck	March. 28, 2014	3047
HORN-Antenna	3115	EMCO	Nov. 21, 2013	9012-3602
HORN-Antenna	SAS-571	A.H. SYSTEMS	Nov. 21, 2013	500
PRE AMPLIFIER	8449B OPT H02	Rohde & Schwarz	Oct. 09, 2013	3008A0530

Note : 1. The calibration interval of the above test instruments is 12 months  
and the calibrations are traceable to RRL, KRISS, KTL and HCT.

2. The calibration interval of horn ant. and loop ant. is 24 months

**Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

$$\text{Peak} = \text{Reading} + \text{Corrected Factor}$$

Where Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)





### Radiated Spurious Emission Result

[Applicable]

**Spurious Emissions Test (Below 1GHz) :**

Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, packet types and antenna ports (if EUT with antenna diversity architecture), and X, Y, Z Axis.

EUT	ITQ700	PROBE	Below 1 GHz
POWER	120 Vac, 60 Hz	NOTE	WLAN mode

Frequency MHz	Reading dBuV	P (H,V)	Ant. Factor dB	Cable Loss dB	Limit dBuV	Total dBuV	Margin dB
36.792	8.10	V	11.35	1.02	40.00	20.47	-19.53
84.326	8.90	V	7.75	1.53	40.00	18.18	-21.82
108.575	6.20	H	10.03	1.76	43.50	17.99	-26.51
129.918	7.40	V	11.68	1.90	43.50	20.98	-22.52
160.951	11.60	V	13.22	2.13	43.50	26.95	-16.55
456.801	13.70	V	16.79	3.61	46.00	34.10	-11.90
*476.282	15.20	H	17.34	3.71	46.00	36.25	-9.75

Note :

1. Remark "\*" means that the data is the worst emission level.
2. All reading levels are Quasi-peak value.
3. Measurement level = reading level + correct factor



**Spurious Emissions Test (Above 1GHz) :**

Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, packet types and antenna ports (if EUT with antenna diversity architecture), and X, Y, Z Axis.

● **802.11b**

EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac, 60 Hz	CHANNEL	1 Channel (2412 MHz)
MODE	802.11b		

**Test Data**

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
1.862	43.75	31.02	V	74.00	54.00	30.25	22.98
3.965	48.21	35.73	V	74.00	54.00	25.79	18.27
4.801	49.93	36.70	V	74.00	54.00	24.07	17.30
5.183	50.54	37.48	V	74.00	54.00	23.46	16.52
7.662	56.22	42.62	V	74.00	54.00	17.78	11.38
1.422	43.51	29.62	H	74.00	54.00	30.49	24.38
1.874	42.84	30.04	H	74.00	54.00	31.16	23.96
3.226	47.59	36.29	H	74.00	54.00	26.41	17.71
4.834	67.24	47.74	H	74.00	54.00	6.76	6.26
5.487	50.98	37.95	H	74.00	54.00	23.02	16.05

EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac, 60 Hz	CHANNEL	6 Channel (2437 MHz)
MODE	802.11b		

**Test Data**

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
1.857	43.05	30.89	V	74.00	54.00	30.95	23.11
4.547	48.77	36.75	V	74.00	54.00	25.23	17.25
5.057	49.57	37.29	V	74.00	54.00	24.43	16.71
1.423	43.38	29.19	H	74.00	54.00	30.62	24.81
3.231	46.77	35.29	H	74.00	54.00	27.23	18.71
4.887	67.17	46.93	H	74.00	54.00	6.83	7.07
7.316	56.59	41.68	H	74.00	54.00	17.41	12.32



EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac 60 Hz	NOTE	11 Channel (2462 MHz)
MODE	802.11b		

**Test Data**

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
1.223	41.36	27.63	V	74.00	54.00	32.64	26.37
1.862	42.89	29.89	V	74.00	54.00	31.11	24.11
3.190	47.71	35.74	V	74.00	54.00	26.29	18.26
1.423	42.73	29.08	H	74.00	54.00	31.27	24.92
2.133	44.52	32.03	H	74.00	54.00	29.48	21.97
4.933	66.32	45.79	H	74.00	54.00	7.68	8.21

Note : Reading(dBuv) : Measurement Level + Ant Factor + Cable Loss - Amp Gain

● **802.11g**

EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac, 60 Hz	CHANNEL	1 Channel (2412 MHz)
MODE	802.11g		

**Test Data**

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
1.862	42.94	30.30	V	74.00	54.00	31.06	23.70
3.172	46.81	35.76	V	74.00	54.00	27.19	18.24
4.412	48.71	36.79	V	74.00	54.00	25.29	17.21
5.752	49.65	38.29	V	74.00	54.00	24.35	15.71
1.422	43.01	29.05	H	74.00	54.00	30.99	24.95
2.131	44.02	31.83	H	74.00	54.00	29.98	22.17
3.206	47.82	35.43	H	74.00	54.00	26.18	18.57
4.835	65.26	47.25	H	74.00	54.00	8.74	6.75



EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac, 60 Hz	CHANNEL	6 Channel (2437 MHz)
MODE	802.11g		

**Test Data**

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
1.872	43.79	29.66	V	74.00	54.00	30.21	24.34
3.831	47.80	35.26	V	74.00	54.00	26.20	18.74
5.663	50.24	38.61	V	74.00	54.00	23.76	15.39
1.421	42.45	28.95	H	74.00	54.00	31.55	25.05
3.074	47.02	34.68	H	74.00	54.00	26.98	19.32
4.872	65.08	46.74	H	74.00	54.00	8.92	7.26

EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac 60 Hz	NOTE	11 Channel (2462 MHz)
MODE	802.11b		

**Test Data**

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
1.863	43.41	31.15	V	74.00	54.00	30.59	22.85
3.154	47.26	35.71	V	74.00	54.00	26.74	18.29
4.405	48.92	36.81	V	74.00	54.00	25.08	17.19
5.966	50.42	38.78	V	74.00	54.00	23.58	15.22
1.432	43.01	28.32	H	74.00	54.00	30.99	25.68
1.863	45.72	32.75	H	74.00	54.00	28.28	21.25
4.401	48.70	37.07	H	74.00	54.00	25.30	16.93
5.758	50.71	38.27	H	74.00	54.00	23.29	15.73

Note : Reading(dBuv) : Measurement Level + Ant Factor + Cable Loss - Amp Gain



● 802.11n

EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac, 60 Hz	CHANNEL	1 Channel (2412 MHz)
MODE	802.11n		

Test Data

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
1.324	41.77	27.84	V	74.00	54.00	32.23	26.16
1.861	43.37	30.92	V	74.00	54.00	30.63	23.08
3.174	47.32	35.50	V	74.00	54.00	26.68	18.50
5.584	50.79	30.30	V	74.00	54.00	23.21	23.70
1.421	42.99	28.58	H	74.00	54.00	31.01	25.42
1.861	46.00	33.01	H	74.00	54.00	28.00	20.99
4.825	61.55	45.44	H	74.00	54.00	12.45	8.56
5.651	50.72	38.54	H	74.00	54.00	23.28	15.46
7.299	58.65	43.03	H	74.00	54.00	15.35	10.97

EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac, 60 Hz	CHANNEL	6 Channel (2437 MHz)
MODE	802.11n		

Test Data

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
1.856	43.81	31.54	V	74.00	54.00	30.19	22.46
4.336	49.22	37.02	V	74.00	54.00	24.78	16.98
5.730	50.45	38.47	V	74.00	54.00	23.55	15.53
1.419	42.46	29.20	H	74.00	54.00	31.54	24.80
1.859	43.56	31.39	H	74.00	54.00	26.44	18.61
3.189	47.82	36.06	H	74.00	54.00	26.18	17.94
4.869	62.34	47.24	H	74.00	54.00	11.66	6.76



EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac 60 Hz	NOTE	11 Channel (2462 MHz)
MODE	802.11n		

**Test Data**

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
1.862	45.38	31.73	V	74.00	54.00	28.62	22.27
5.132	49.15	37.99	V	74.00	54.00	24.85	16.01
5.732	50.22	38.52	V	74.00	54.00	23.78	15.48
1.422	43.23	29.57	H	74.00	54.00	30.77	24.43
2.132	46.51	33.06	H	74.00	54.00	27.49	20.94
4.922	63.46	47.44	H	74.00	54.00	10.54	6.56
5.712	50.30	38.32	H	74.00	54.00	23.70	15.68

*Note : Reading(dBuv) : Measurement Level + Ant Factor + Cable Loss - Amp Gain*



### Radiated Restricted Band Edge Result

● **802.11b**

EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac 60 Hz	NOTE	1 Channel (2412 MHz)
MODE	802.11b		

**Test Data**

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
2.386	44.20	34.70	V	74.00	54.00	29.80	19.30
2.386	53.29	47.34	H	74.00	54.00	20.71	6.66
2.357	43.81	30.97	V	74.00	54.00	30.19	23.03
2.347	45.21	32.90	H	74.00	54.00	28.79	21.10

EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac 60 Hz	NOTE	11 Channel (2462 MHz)
MODE	802.11b		

**Test Data**

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
2.486	43.94	32.63	V	74.00	54.00	30.06	21.37
2.486	53.33	45.81	H	74.00	54.00	20.67	8.19

Note : Reading(dBuv) : Measurement Level + Ant Factor + Cable Loss - Amp Gain

● **802.11g**

EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac 60 Hz	NOTE	1 Channel (2412 MHz)
MODE	802.11g		

**Test Data**

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
2.389	49.02	36.44	V	74.00	54.00	24.98	17.56
2.391	68.01	42.41	H	74.00	54.00	5.99	11.59



EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac 60 Hz	NOTE	11 Channel (2462 MHz)
MODE	802.11g		

**Test Data**

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
2.483	53.87	37.46	V	74.00	54.00	20.13	16.54
2.483	67.12	47.95	H	74.00	54.00	6.88	6.05

Note : Reading(dBuv) : Measurement Level + Ant Factor + Cable Loss - Amp Gain

● **802.11n**

EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac 60 Hz	NOTE	1 Channel (2412 MHz)
MODE	802.11n		

**Test Data**

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
2.389	48.18	35.74	V	74.00	54.00	25.82	18.26
2.389	66.46	48.56	H	74.00	54.00	7.54	5.44

EUT	ITQ700	PROBE	Above 1 GHz
POWER	120 Vac 60 Hz	NOTE	11 Channel (2462 MHz)
MODE	802.11n		

**Test Data**

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
2.484	51.29	36.02	V	74.00	54.00	22.71	17.98
2.484	67.93	47.96	H	74.00	54.00	6.07	6.04

Note : Reading(dBuv) : Measurement Level + Ant Factor + Cable Loss - Amp Gain





## **Antenna requirements**

### **According to FCC 47 CFR 15.203**

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

\* the antenna of this EUT is a unique(PCB Antenna).

\* the EUT complies with the requirement of 15.203